Universiteit Leiden

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Faculteit der Sociale Wetenschappen

Exploring Prosocial Behaviour: Developmental changes from adolescence to adulthood and a relationship to thought content during mind wandering

Ioanna Roussou

Master Thesis Child & Adolescent Psychology

Date: 23/11/16

Student number: s1623273

Supervisor: Nikolaus Steinbeis

Second reader: Harrie Boelens

ABSTRACT

Prosocial behaviour is a term used to describe specific positive behaviours towards others, such as helping, sharing, working together towards a common goal or comforting. This study examined developmental differences in prosocial behaviour between adolescents and adults and found, in agreement with the results of previous relevant researches, that adults tend to act more pro-socially than adolescents. The Zurich Prosocial Game was used in order to examine the effect of reciprocity, cost and distress of the other on the participants' helping behaviour. A significant effect of reciprocity was found for both adults and adolescents. Furthermore, the link was examined between prosocial behaviour and thought content during mind-wandering. The current study examined the relation between helping behaviour in the ZPG and the following thought contents: past-oriented, future-oriented, self-oriented, other-oriented, negative and positive. A negative relation was found between helping behaviour and past-oriented and positive thought contents.

Keywords: prosocial behaviour, mind-wandering, thought content, reciprocity, Zurich Prosocial Game

1. Introduction

The term "prosocial" is used to describe specific positive behaviours towards others, such as helping, sharing, working together towards a common goal or comforting (Scourfield, Martin & McGuffin, 2004); thus, prosocial behaviour can be thought of as the opposite of "antisocial" behaviours, as suggested by Wispe (1972), or "proself" behaviours (van de Bos, van Dijk, Westenberg, Rombouts & Crone, 2011). According to Hay (1994), "prosocial behaviour" replaced vaguer terms formerly used in research such as "altruism", "selflessness" and "self-sacrifice" in order to describe any kind of positive behaviour towards another person, regardless of the motivation behind it. In contrast with the aforementioned terms that may imply some form of sacrifice or cost for the actor, "prosocial behaviour" is used to describe actions that might often lead to beneficial consequences for the actor, including appraisal, attention and high self-esteem.

Existing literature has found different types of prosocial behaviour, which helps to highlight the complex nature of personal motives, and contextual influences underlying prosocial behaviours. For example, Carlo and his colleagues (Carlo & Randall, 2002) found six types of prosocial tendencies: compliant (helps when asked to), dire (helps in emergency situations), emotional (helps in emotionally evocative situations), altruistic (helps without expecting reward), anonymous (helps without anyone knowing), and public (helps when people are watching). Previous research investigating quantitative and qualitative nuances in the manifestations of prosocial behaviour, suggests an intertwining effect of genes and environment (Scourfield, Martin & McGuffin, 2004; Knafo & Plomin, 2006); environmental influences include socialization processes (such as parenting and modelling of prosocial behaviours) and cultural orientations (Brittain, 2015), as well as the influence of socially defined norms, such as fairness and reciprocity. It has been found that, in general, people are more likely to demonstrate prosocial behaviour if a) they have been the recipients of prosocial behaviour before, b) it does not involve high cost for them and c) the situation at hand is marked by others' distress signals. (Leiberg, Kilmecki & Singer, 2011).

1.1. Development of prosocial behaviour

Although understanding the psychological, developmental and social background of prosocial behaviour has been the quest of many researchers and theorists, defining the exact patterns of its development through specific age-constricted developmental stages, as presented for example in the theories of Piaget (1932) or Kohlberg (1984) has been a challenge. Much of the existing literature disagrees on many aspects of prosocial behaviour, such as the motives behind it or its measurability; it does however converge on the observation that, generally, manifestation of prosocial behaviour increases as individuals grow older (Fabes, Carlo, Kupanoff &Laible, 1999; Matsumoto, Yamagishi, Li & Kiyonari ,2016). Nevertheless, as it is explained later in this study, this increase is not necessarily linear throughout the individual's life span (Eisenberg, Hofer, Sulik & Liew, 2014 ; van de Bos et al., 2011; Luengo Kanacri, Pastorelli, Eisenberg, Zuffiano, Castellani & Carpara, 2014; Eisenberg, Carlo, Murphy & van Court, 1995). Additionally, the type and amount of prosocial behaviour that an individual demonstrates follow different patterns depending on gender, cultural context and personality traits (Scourfield et al., 2004; Hay, 1994; Brittian, 2015).

A way to approach this complicated issue is to separately explore the development of each of the socio-cognitive and cognitive-affective key-components of prosocial behaviour in individuals over age, as defined by previous studies. These key-components include a) moral reasoning, which "is defined as the ability or tendency to think about and make decisions in situations in which there may be conflicting values, norms, rules or laws, needs, or desires" (Fabes et al., 1999; Eisenberg et al., 2014), b) social cognition, which includes understanding of the self, others and the relations that regulate interactions between them (Hart, 1995), c) perspective taking, mentalizing or theory of mind, which refer to the ability to understand the internal or external states of other individuals and their social context (Fabes et al.,1999 ; Crone & Dahl, 2012), and d) empathy and/or sympathy and other related emotional responses (Fabes et al., 1999 ; Leiberg et al., 2011; Eisenberg et al., 2014).

1.1.1 Development of prosocial behaviour in adolescence

Studies comparing the occurrence of prosocial behaviour in childhood and adolescence have shown that prosocial behaviour increases as children grow older (Brittian et al., 2015; Fabes et al., 1999), as "one of the main changes in the nature of social interactions in adolescence is the shift from self-oriented behaviour towards other-oriented (that is, pro-social) behaviour" (Crone & Dahl, 2012). This development in prosocial behaviour can be observed parallel to Eisenberg's findings on the developmental stages of prosocial moral reasoning (Eisenberg et al., 2014). More specifically, Eisenberg has found that a) young children mainly demonstrate hedonistic moral reasoning, b)later on, in elementary school, need-oriented (i.e. referring to what others need) moral reasoning and proclivity to behave in a "stereotypically" good way increases and c) in early adolescence the first signs of perspective taking and internalized abstract principles and affective reactions (i.e. guilt or positive emotions about the good consequences of good behaviour or of living up to those principles) arise and gradually increase up to late adolescence.

Moreover, Brittian (2015) and Fabes et al. (1999) also attribute the development of prosocial behaviour to pubertal changes, changes in the social environment (e.g. higher social demands and expectations to adhere to social norms, more opportunities to act pro-socially at home, at school, in the community), the development of symbolic thinking and abstract concepts, the increased importance of peer relationships and of the concept of mutuality. Crone and Dahl (2012) also found that the adolescents' increasing cognitive control over their emotion and impulses as well as their social environment (e.g. popular adolescents tend to be more prosocial) play an important role , which is consistent with Leiberg's (2015) finding that people who have received prosocial behaviour are more likely to reciprocate.

As mentioned before, research has shown that prosocial behaviour develops and increases as the individual grows older, but this development does not follow a linear pattern during adolescence. In the transition from early to late adolescence, individuals are more inclined towards self-oriented thought, but gradually start

manifesting increased prosocial behaviour tendencies. (van de Bos et al. , 2011). However, mid-adolescence (12-16), which Steinberg (2005) defines as a "period of heightened vulnerability to risk-taking and problems in regulation of affect and behaviour" is a crucial transitional period for the development of intentionality and social behaviour, and big discrepancies are observed between individuals. More specifically, Eisenberg (Eisenberg et al. 2014; Eisenberg et al., 1995) has found a small increase of hedonistic moral reasoning, particularly in male adolescents. In consistency with that finding, a longitudinal study by Luengo Kanacri et al. (2013; 2014) found a decline in prosocial behaviour in mid-adolescence and a rebound in late adolescence and early adulthood.

1.1.2 Prosocial Behaviour in adulthood

The process of individualization of the prosocial development peaks in adulthood, when integrative moral reasoning is formed and specific personality traits are stabilized. However, literature has focused on several, relatively universal, social and cognitive factors that may influence the frequency and content with which prosocial behaviour manifests itself in adulthood.

In early adulthood, a change of priority is noted from behaving well as a form of self-sacrifice to behaving in a responsible manner for the self as well as others (Gilligan, 1977). Eisenberg et al. (2014) report the emergence of new social demands and conditions such as earning a living or starting a family as strong influential factors on adults' moral judgement. This intense engagement with such concerns and situations (parenting, working demands etc.) may be related to young adults' growing tendency to behave "stereotypically" well (i.e. according to what is defined as appropriate behaviour by social norms) and to seek social approval and acceptance (Crone & Dahl, 2012; Eisenberg et al, 2014 ; Eisenberg et al. , 1995); both of these are behaviours that were observed in previous moral reasoning developmental phases, a fact that adds to Eisenberg et al.' (1995) finding that "at least some of the processes involved in prosocial development are relatively stable across adolescence and into early adulthood".

1.1.3 Research Question 1

As it is discussed above, age and the developmental changes that come with it, play a quite important role in the development and manifestation of prosocial behaviour. This paper focuses on development-related differences in prosocial behaviour between adolescents and adults. Before forming a specific hypothesis, some particularities of the period of adolescence that inhibit the accurate prediction of prosocial behaviour during that time must be considered: a) adolescents demonstrate motivational and social context-related flexibility in their cognitive control over their behaviour and prioritizing strategies (Crone & Dahl, 2012); b) the further development of cognitive abilities, intentionality and ability to evaluate the situational context (Brittian, 2015) is not necessarily related to actual increases in prosocial behaviour (van de Bos et al. , 2011), especially since c) adolescents generally tend to assist closer friends or people of the same social background and not strangers (Brittian, 2015) and d) adolescents tend to act more emotionally (rather than rationally), which makes them more susceptible to impulsive and immature decisions, behaviours that aim for peer admiration, involve higher risk taking and neglect long term consequences of their actions (Crone & Dahl, 2012; Steinberg, 2005). Taking all these developmental facts about prosocial behaviour into account, this thesis will investigate whether the likelihood that individuals will act pro-socially is higher in adolescents or adults. In consideration of various previous findings that prosocial behaviour increases with age, the hypothesis tested in this thesis is that prosocial behaviour will be more common among adults, when compared to adolescents.

Furthermore, this thesis examines whether there is a different effect of the aforementioned influential factors, namely reciprocity, cost of the behaviour and existence or not of distress signals, on the demonstration of prosocial behaviour for the two age groups.

1.2 Prosocial Behaviour and Mind-Wandering

Research has shown that there are differentiated trends of prosocial behaviour demonstrated within the same age-group, which cannot be attributed to specific developmental factors, but are more likely related to the particular personality traits of the individual. More specifically, Luengo Kanacri et al. (2014) studied these personality traits, defined by scholars as "individual differences in tendencies to show consistent patterns of thoughts, feelings, and actions" (McCrae & Costa, 1990), as predictor factors for prosocial behaviours. Hay (1994) also claimed that "as children grow older, prosocial tendencies become more of an individual characteristic and less of a general approach to social life". Taking into account these individual differences, it makes sense to explore the impact of various thought patterns shown by the individual on the manifestation of prosocial behaviour, regardless of their age.

In order to investigate this further, the current study focused on mind-wandering as a cognitive phenomenon that may help predict the occurrence of prosocial behaviour in individuals. Previous research (Kam & Handy, 2015) has examined the probability of prosocial behaviour occurring while the mind is wandering and has shown that, during mind wandering, it seems more likely that the individual will fail to notice the pain of others, and will thus fail to demonstrate prosocial behaviour. Although this is an important point to keep in mind, when examining the consequences of frequent and intense mind-wandering, this study has a rather different focus point: it explores the degree to which the individual's specific thought content trends (such as negative or positive thoughts), as they are revealed in the external-stimuli-independent condition of mind-wandering, may correlate to either the manifestation or lack of prosocial behaviour.

Smallwood and Schooler (2015) define mind-wandering as "a shift in the contents of thought away from an ongoing task and/or from events in the external environment to self-generated thoughts and feelings". It is safe to assume that these self-generated thoughts (thoughts unrelated to the here and now) can reveal quite a lot about the individual's general way of thinking and cognitive state, because, as research has shown, these thoughts may occur during as much as 50% of the waking hours of the human brain (Killingsworth & Gilbert, 2010). Generally speaking, mind-

wandering appears to be a universal experience for all individuals, regardless of age, culture, or psychological factors, that has been linked to negative consequences such as driving accidents and lower performance on tasks; however, it is so frequent and common that a lot of research has focused on investigating its benefits in order to shed some light onto its possible developmental value.

The associated benefits of mind-wandering may include creativity, prospection and problem solving (Smallwood & Schooler, 2015) and most studies have specifically linked those with the content of thoughts during mind-wandering. On that matter, the content regulation hypothesis (Smallwood & Andrews-Hanna, 2013) suggests "that self-generated thoughts are particularly beneficial for individuals who are able to regulate the content of the experience to positive or productive topics". Research has shown that a) while mind-wandering, people tend to generate future-oriented thoughts (Smallwood & Schooler, 2015; Ruby, Smallwood, Engen & Singer, 2013) and b) thoughts projected to the future can help reduce negative mood (Ruby et al., 2013). These future-oriented thoughts are generally perceived as more positive, when compared to past-oriented thoughts (Andrews-Hanna et al., 2013), and research has linked past-oriented thoughts to negative content and emotional outcomes. According to Smallwood and Schooler (2015), "unhappiness is particularly pronounced for [mind-wandering] episodes focused on the past". Moreover, Ruby et al. (2013) have found that past-other-related thoughts were followed by a decrease in the individual's mood, even if the content of these thoughts was reported as positive.

To summarize, it seems that specific thought contents have been associated with specific emotional states and can help predict specific behaviours (Ruby et al., 2013). An interesting study by Jazaieri et al. (2016), examining the effect of thought content on the frequency of caring behaviours, showed that "mind wandering to unpleasant and neutral topics predicted less caring behaviours towards others", but found no significant impact for positive thought contents. Moreover, Leiberg et al. (2011) argue that "inducing feelings of empathic concern for a person in need by having participants focus on the person's feelings increases their prosocial behaviour towards that person"; therefore it would make sense to assume that other-oriented

thought during mind-wandering would more strongly correlate to the manifestation of prosocial behaviour.

1.2.1 Research Question 2

Prosocial behaviour has been found to be an indicator of healthy social adjustment, emotional well-being and mental health (Weinstein & Ryan, 2010). Keeping that in mind, and also considering the relevant findings on mind-wandering, this thesis will explore the specific thought content (future/past-oriented, other/self-oriented, positive/negative) of mind-wandering episodes, in an attempt to better understand the link between thoughts and prosocial behaviour at the individual level. More specifically, it will examine whether and which of the aforementioned types of thought content can be linked to the occurrence of prosocial behaviour, leaving other influential factors aside. Based on the existing literature, it is expected that lower prosocial behaviour scores will be linked with negative and past-oriented contents.

2. Methods

2.1 Participants:

For this research, a random sample of 257 participants (130 male; 127 female) was used. The sample consisted of two different age groups: 112 adults (age range = 19-25 years; mean age = 23; 5) and 145 adolescents (age range = 13-18 years; mean age = 14; 7).

2.2 Procedure

The total sample population was divided into two groups, based on the participant's age, in order to examine the influence of developmental differences on prosocial behaviour (Between-Groups design). Two different experiments were

conducted on the same sample populations (both adults and adolescents) in order to investigate the relationship between the manifestation of prosocial behaviour and thought content during mind wandering (Within-Subjects design).

2.3 Materials:

Experiment 1: In order to measure prosocial behaviour in both age groups, participants were asked to take part in a newly developed task that aims to measure prosocial behaviour in individuals, namely the Zurich Prosocial Game – (ZPG) (Leiberg et al., 2011). The ZPG is played by the participant and a second player who is simulated by the computer, although not to the knowledge of the participant. In order to play the game, the participant has to navigate a virtual character along a maze in order to reach a treasure within a pre-specified time; each treasure is worth 0.50 Euros. In the meantime, they can see the alleged second player moving on a different path in order to reach another treasure. The players are equipped with red and blue keys that open gates of the same colour that fall on their path, as they move along the maze. The players can use these keys to open matching gates either on their own path or on the path of the alleged second player, in order to help them. The frequency of opening the gate for the other player is the measure of prosocial behavior in the ZPG. The participant is aware of the second player's existence but not of the fact that the player is simulated by the computer; however, as the two characters are set in different paths and are trying to reach different treasures, the participant can choose to either ignore or help the other player, without being influenced by feelings of competitiveness. According to the instructions provided to all participants, the objective goal of the game is to reach their treasure as fast as possible.

In order to test the specific influence of a series of factors in the manifestation of prosocial behaviour, each participant is asked to perform in a number of trials that are introduced as new mazes with a new treasure to reach and a new alleged opponent. Among others, conditions that were measured and examined in this particular experiment were a) reciprocity/non-reciprocity (the

participant has or has not already received help in the form of keys from the second player), b) low/high cost (the participant is risking or not risking their own progress in the game by helping the second player) and c) distress signals/no distress signals (the participant receives or does not receive auditory cues such as crying that signal distress of the alleged second player on the headphones that they are asked to wear while playing the game).

According to research done by the original developers of the ZPG, there are many advantages to the game. The ZPG was chosen for the current study because of these advantages that allow the presumably unbiased assessment of prosocial behaviour in adults and adolescents. More specifically, it has proven to be a particularly engaging and appropriate game for all ages, which means that it can be used to measure differences attributed to the specific developmental traits of each age group, and not to the effect of the game (e.g. level of difficulty) on each group. Secondly, it is sensitive to several aspects that may influence the manifestation of prosocial behaviour (e.g. rules of reciprocity, cost and distress signals), which again means that it allows the quantitative distinction of prosocial behaviour between adults and adolescents, regardless of the age-related influence on each participant's motives and reactions. Last but not least, the ZPG is considered especially "ecologically valid" (Leiberg et al., 2011), because it focuses on the effect of emotions and spontaneity, while minimizing the effect of specific pro-socially oriented instructions or strategies as well as the effect of competitiveness.

Experiment 2: The content of self-generated thoughts of participants during incidents of mind-wandering was investigated. Mind-wandering was monitored in two phases: during an easy and during a more difficult task. In both tasks, participants were asked to observe a screen, on which either the letter X or the letter O appeared in randomized order. In the easy Choice Reaction Time (CRT) task, participants were asked to click the left mouse button if the stimulus displayed on the screen was X, and the right mouse button if the stimulus was O. In the more demanding Working Memory (WM) task, a question mark was displayed on the screen after a random number of X/O stimuli were shown; the participants were then asked to recall what the last displayed letter was and click the left mouse

button if they thought that the letter was X and the right mouse button if they thought that the letter was O.

In order to examine the thought content of participants during task completion, the method of Experience Sampling (Smallwood & Schooler, 2015) was employed: every now and then the task was interrupted and participants had to place the content of their thoughts on the following scales (from 1 to 100): A)Task Related/Task Unrelated thought ("When the task stopped, were you thinking about the task or about something else?") ; B) Future-oriented Thought ("Were you thinking about something in the future?"); C) Past-oriented Thought ("Were you thinking about something in the past?") ; D) Positive affect ("Were you thinking about something positive?"), E) Negative affect ("Were you thinking about something negative?") , F) Self-oriented thought ("Were you thinking about yourself?), G)Other-oriented thought ("Were you thinking about someone else?").

2.4 Statistical Analysis:

In order to examine the first research question, that concerned the differences in the manifestation of prosocial behaviour in the two age groups, the following steps were taken: the mean score of Total Helping Behaviour during the ZPG was calculated for each participant, taking into account their performance score in each of the trials in the ZPG. Each player got 0 points for the trials where they did not provide any help and 1 point for the trials where they helped their opponent; the mean score of all trials therefore lies between 0 and 1 for each participant. A T-Test was then used to compare the mean scores of Total Helping Behaviour of the two different age groups, Adults and Adolescents. Furthermore, as the same sample population participated in all the differentiated trials of the game, a Mixed-Design ANOVA was conducted to investigate the effect of each aforementioned factor (i.e. Reciprocity/No Reciprocity, High Cost/Low Cost, Distress/No Distress) and interaction thereof on the dependent variable, namely the Total Helping Behaviour Score, with age group as the between-subjects factor.

The second research question examined the relation between thought content during mind-wandering and prosocial behaviour. The predictor variables that were the different types of thought content (i.e. Self-Oriented Thoughts, Other-Oriented Thoughts, Future-Oriented Thoughts, Past-Oriented Thoughts, Positive Thoughts and Negative Thoughts) were compared to the outcome variable Total Helping Behaviour Score using Pearson's correlation analysis.

3. Results

3.1.1 Research Question 1a

In Table 1, statistical information is provided for both age groups. As can be seen below, the average score of adults in Helping Behaviour was higher *(M*= .64*, SD* = .25) when compared to the average score of adolescents (*M* = .49*, SD* = .28*).* An independent T-Test was run to test the hypothesis that Adults would demonstrate significantly higher scores in Total Helping behaviour the ZPG, when compared to Adolescents. This initial hypothesis was confirmed, because a significant difference was found between the two groups (t (248) = -4.39, p > .001).

Table 1

Mean Age and Helping Behaviour Scores for Adolescents and Adults.

Group		Minimum	Maximum	Mean	Std. Deviation
Adolescents	Age	12.9	17.9	14.7	1.23
	Helping Behaviour Score	0	1	.49	.28
Adults	Age	19.6	25.6	23.5	1.26
	Helping Behaviour Score	0	1	.64	.25

3.1.2 Research Question 1b

Furthermore, a Mixed Design ANOVA was conducted, with age group as the between-subjects Factor and trial conditions as the within-subjects factor, in order to examine the effects of age group (Adults and Adolescents) and trial conditions (Reciprocity, Cost and Distress) and the interaction thereof. As can be seen in Table 2

below, for α = .05, there was a main significant effect of Reciprocity on the participants ($F(1, 248) = 197.15$, $p > .001$) regardless of which age group they belonged to; the condition of Distress had no significant effect of the helping scores ($F(1, 248) = .60$, $p = .44$); the *interaction* effect between the age of the participants and the condition of cost was significant ($F(1, 248) = 4.52$; $p = .03$), meaning that the condition of cost affected the participants differently, depending on which age group they belonged to (Adults/Adolescents).

Table 2

*Mixed Design ANOVA for Age Group * Reciprocity, Distress and Cost.*

Effect	df	F	Sig.
Reciprocity	1	197.15	**.00**
Reciprocity * Age Group	1	.17	.68
Distress	1	.60	.44
Distress * Age Group	1	.36	.55
Cost	1	.68	.41
Cost * Age Group	1	4.52	**.03**
Reciprocity * Distress	1	1.18	.28
Reciprocity * Distress * Age Group	1	1.81	.18
Reciprocity * Cost	1	1.61	.21
Reciprocity * Cost * Age Group	1	1.91	.17
Distress * Cost	1	.68	.41
Distress * Cost * Age Group	1	.48	.,49
Reciprocity * Distress * Cost	1	.21	.65
Reciprocity * Distress * Cost * Age Group	1	.00	.96

In the bar chart (Figure 1) below, mean helping scores are presented for all participants in each of the eight differentiated trials. In trials 1-4 no reciprocity was provided to the players; in trials 5-8 the condition of reciprocity was provided.

Figure 2 helps highlight the interaction between Cost and Age group. As expected, adults scored lower in helping behaviour when higher cost was involved. Adolescents, on the other hand, scored slightly higher in high cost conditions (M= .51 vs. M = .48 for low cost trials). Nevertheless, no significant main effect of cost was found for the total population of participants (Table 2).

Figure 1. Mean helping behaviour scores sorted by no reciprocity/reciprocity.

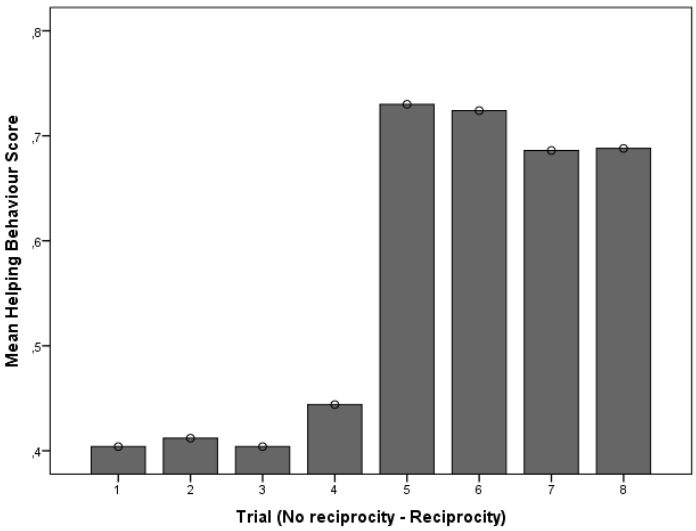
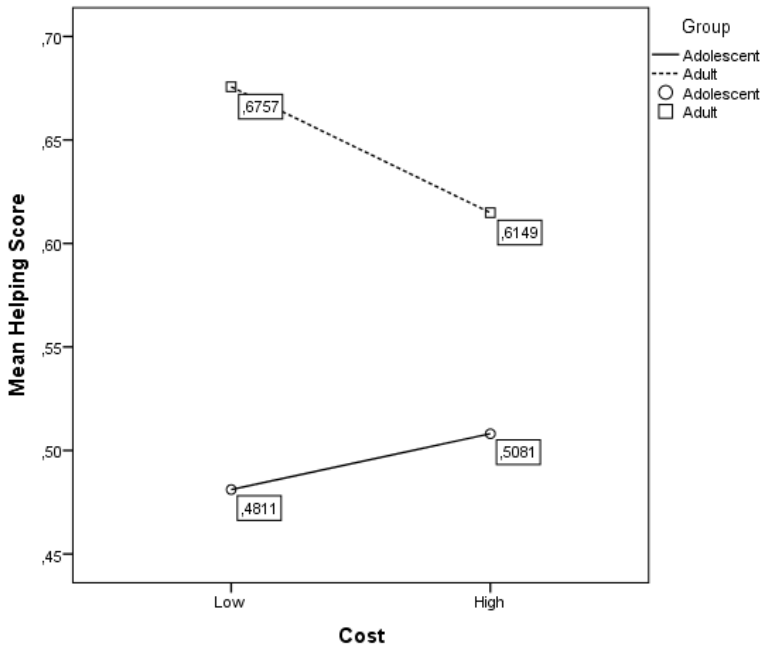


Figure 2 . Interaction Effect of Cost and Age Group.



3.2 Research Question 2

In order to explore the second research question, in which the link between specific thought contents and the Total Helping Behaviour Score was examined, correlation analysis was used.

In Table 3 below, all Pearson Correlations are presented between each type of thought content (Self-Oriented; Other-Oriented; Future-Oriented; Past-Oriented; Positive and Negative). However this study specifically focuses on whether and how each of the aforementioned types of thought correlate to the manifestation of Helping Behaviour. According to the results presented in the table, a significant relationship has been found between Total Helping Behaviour Scores and Past-Oriented Thoughts ($r = -.16$, $p < .05$) as well as Positive Thoughts ($r = -.13$, $p < .05$). Both content types seem to be negatively related to the manifestation of Helping Behaviour, meaning that individuals that reported more past-oriented or more positive thoughts tended to demonstrate less helping behaviour during the ZPG.

Table 3

Pearson Correlations for Total PB and Types of Thought Content.

		1.	2.	3.	4.	5.	6.	7.
1.	Total PB Mean Score	1						
2.	Self-oriented	-.07	1					
3.	Other-oriented	-.05	.17*	1				
4.	Future-oriented	-.03	.3**	.33**	1			
5.	Past-oriented	-.16*	.12	.08	-.02	1		
6.	Positive	-.13*	.19**	.31**	.31**	-.12	1	
7.	Negative	-.09	.19**	-.01	.04	.36**	-.49**	1

significant correlation at level * p < .05; ** p <.01

4. Discussion

4.1 First research question

The first research question focused on developmental differences in the manifestation of prosocial behaviour between adults and adolescents, by examining the tendency of adults and adolescents to help others in the ZPG, a game specifically designed to measure prosocial behaviour under different conditions (such as reciprocity, signs of distress and high or low cost). Following the findings of relevant researches, the hypothesis tested in this thesis was that adults would demonstrate

higher helping scores compared to adolescents. This hypothesis was confirmed. It was also expected that helping scores would be higher for both groups when reciprocity was provided in advance, signals of other players' distress were present and helping involved low cost for the participants. This hypothesis was partially confirmed: players in both age groups indeed tended to help more, when they had been helped before. However, distress signals did not seem to influence the behaviour of the players. The high/low cost factor did also not affect the helping behaviour of the participants in total; however an interaction effect with age was found, which means that differentiations in the participants' behaviour in the two different cost conditions can be attributed to their age group (Adult/Adolescent). In general, adolescents scored slightly higher in high cost conditions, whereas adults scored slightly lower.

4.1.1 Age and Gender as Influential Factors on Prosocial Behaviour

Generally speaking, the results of this study are in compliance with the literature findings that prosocial behaviour increases as the individual grows older; however, there are several points to take into account, before reaching a final conclusion. First of all, the age range of the Adult group was quite limited (19-25), which means that the results can contribute to a better understanding of prosocial behaviour only for early adulthood. In fact, the age difference between the two groups (Adolescents and Adults) is quite narrow (see Table 1 above). This calls for further research on which exact changes –be it developmental or environmental- take place in such a brief period that cause this significant increase in the individuals' manifestation of prosocial behaviour. According to Steinberg (2005), "there is considerable evidence that the second decade of life is a period of great activity with respect to changes in brain structure and function, especially in regions and systems associated with response inhibition, the calibration of risk and reward, and emotion regulation", which play an important role in the individual's decision making processes. In the attempt to explain the age-related deviation in prosocial behaviour, one should also bear in mind the aforementioned finding by Luego Kanacri et. al.

(2013) as well as other similar findings of a certain decline in prosocial behaviour in mid-adolescence and a rebound in late adolescence and early adulthood, as it may partially explain the lower scores in the Adolescent group.

In the current study, the influence of the gender effect was minimized by allowing an almost equal gender distribution for both age groups (50% male; 50% female). However, the amount of researches that highlight gender as one of the most influential factors for prosocial behaviour is large (e.g. Kuhnert, Begeer, Fink & De Rosnay, 2016; Stevenson, 1997; Hay, 1994); thus, it would be interesting to examine the effect of gender on the ZPG scores and more specifically, whether the size of this effect changes from adolescence to adulthood and how.

4.1.2 The effect of trial conditions on prosocial behaviour

The results of this study regarding adults' helping behaviour during the ZPG were in agreement with Leiberg et al.' findings (2011) that individuals are more likely to help others when they have been helped before. The rather unexpected differentiation that was found between adults and adolescents, concerning the influence of the cost involved calls for further investigation and could be linked to Crone's (2012) and Steinberg's (2005) findings concerning increased impulsive and risk-taking behavior during adolescence or other developmental factors . Generally speaking, it would be interesting to further explore the development-related nuances in the perception of reciprocity and risk-taking for adults and for adolescents, as they both seem to be important factors in the manifestation of prosocial behaviour. Last but not least, the presence or lack of distress signals during the ZPG did not seem to have an influence on the participants of any group, which again does not comply with previous research findings regarding this effect. It is possible that the explanation for this is purely technical and has to do with the believability of the distress signals the participants were receiving on their headphones while playing the ZPG, since they were simulated by a computer. However, "in the future a fully interactive ZPG will be available" (Leiberg et al., 2011), a change that will help to minimize possible undesired effects.

4.2 Second research question

The second research question investigated possible links between specific types of thought content during mind-wandering and prosocial behaviour. Since the rather limited existing literature on this matter already links mind wandering with a decreased chance of demonstration of caring behaviour and with negative mood in general (e.g. Kam and Handy, 2015; Killingsworth & Gilbert, 2010), it would make sense to expect that only a negative relation between self-generated thoughts and prosocial behaviour would be found in this study and that examining thought content during mind wandering could only help to predict a decreased probability of prosocial behaviour. The initial hypothesis was that low helping scores could be possibly linked to either past-oriented or negative thought contents. This hypothesis was only partially confirmed, as individuals that reported past-oriented thoughts during the experiment also demonstrated less helping behaviour in the ZPG. This finding could be in agreement with previous findings that have linked past-oriented thought content during mind-wandering to negative cognitive and emotional states and psychopathological disorders such as depression (Killingsworth & Gilbert 2010). Surprisingly, less helping behaviour was also demonstrated by individuals that reported positive thought contents. On the other hand, no positive relation was found between prosocial behaviour and any type of thought content, which is in compliance with previous findings that mind wandering can be an indicator of negative emotional states and decreased manifestation of other-oriented behaviour.

4.2.1 Measuring Thought Content

As Smallwood and Schooler (2015) highlight in their study, a significant disadvantage of the available tools for measuring mind-wandering is the fact they rely greatly on self-reports by the individual. In this study, measuring both occurrence and content of mind wandering relied solely on the use of self-reports and self-evaluation, as it was described in the Methods session above. Thus, the influence of factors such as memory, attention and mood must be considered when interpreting the results of this study. Furthermore, when the individuals were asked

to evaluate the content of their thoughts, they were not asked to place them on dipole scales such as Future- or Past-oriented, Self- or Other-oriented etc. On the contrary, they could evaluate the same thought as both future- and past-oriented. By following this method, a more complex portrait of each thought was allowed, in the hopes of providing a clearer link between each specific thought content and prosocial behaviour.

Apart from the reliability of Experience Sampling as the only measure for thought content, other limitations, related to the procedure followed in this study, have to be taken into account. For example, mind wandering and PB were measured in separate tasks (CRT/WM task for mind wandering and the ZPG for prosocial behavior), hence in different periods of time and in different conditions. Therefore, in order to establish a reliable relation between the content of thought during mind wondering and PB, one has to assume that this content remained relatively consistent for each individual, at least for the period of time during which both experiments were conducted.

5. Conclusion

During the turbulent period of adolescence, a series of neuro-developmental and social or environmental changes take place that have been linked through countless researches and studies with various cognitive, social and emotional phenomena, both positive, such as prosocial behaviour and negative, such as the development of mental disorders. Focusing on adolescence and early adulthood in an attempt to better understand the complex nature of prosocial behaviour seems to make sense, because key elements involved in prosocial behaviour such as perspective taking and empathic concern develop significantly during this life period; additionally, measuring and exploring the manifestation of prosocial behaviour of adolescents could provide a better understanding of their socio-emotional and moral development.

Furthermore, in this study an original connection was attempted between prosocial behaviour and mind wandering, a phenomenon which takes up so much of our waking time that its content, when reported correctly, could be considered as a reliable mirror of the individual's cognitive and emotional state. This study found only negative correlations between prosocial behaviour, an indicator of mental wellbeing, and thoughts that occur during mind-wandering. Thus, it can add to previous findings that investigating the phenomenon of mind wandering can help predict the individual's negative mood and behaviour, poor cognitive-emotional states and even psychopathology.

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