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The Role of Skin Color on Children's Biological and Non-Biological Judgments

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Abstract
The following two studies examined the role of skin color on children's biological and non-biological judgments. Study 1 examined preschoolers, first graders, third graders, fifth graders and adults' reasoning about the impact of skin color on the contraction of common contagious illnesses. Study 2 assessed children's and adults' impact of skin color on positive and negative social behaviors. Results for Study 1 indicated that preschoolers judged that the character in the vignette is more likely to contract an illness from someone who is of a different skin color than himself/herself whereas the older participants did not display this bias. Results of Study 2 indicated that preschoolers did not subscribe to skin color affecting positive and negative social behaviors but elementary school childrenand adults did. Older children and adults judged that the character in the vignette would more likely display more positive behaviors towards someone of their own skin color. These results suggest that children are influenced by biosocial factors such as skin color when making judgments about biological processes and non-biological behaviors.

Keywords: Skin Color, Illness, Personality Traits.

Introduction

The literature on children's understanding of biological processes such as the contraction of illness has primarily examined children's causal reasoning about the contraction of contagious illnesses (Kalish, 1996; Raman & Gelman, 2005; Raman & Gelman, 2008; Raman, 2011). The results from these studies have resulted in mixed findings. The first set of findings (Kalish, 1996) states that children as young as 3 years of age exclusively entertain biological causal explanations for biological processes. Moreover they reject non-biological causes for biological processes arguing for the notion that they can distinguish between the mental and biological domains (Coley, 1995; Inagaki & Hatano, 1993; Kalish, 1997; Keil, 1994; Schulz & Gopnik, 2004; Notaro, Gelman, & Zimmerman, 2001; Schulz, Bonawitz, & Griffiths, 2007). This suggests that children exclusively entertain biological explanations for biological processes and reject non-biological causes for biological processes. This type of reasoning has lent evidence to the claim that children have an autonomous theory of biology.

Other studies however, have found that children and even adults entertain non-biological causes such as immanent justice, and psychological factors for the origins of illness (Raman

& Winer, 2002: Raman & Gelman, 2008; Raman, 2011). Raman and Gelman (2008) found that up to second grade, children judged that psychosocial factors such as relatedness decreased the possibility of contracting illness from another person. It was only after second grade that children judged that relatedness did not have an impact on the contraction of illness. Similarly, Raman (2011) found that children responded to psychobiological labels such as 'yucky' and 'yummy' foods as influencing the biological process of growth but not the process of illness contraction. Schulz, Bonawtiz and Griffiths (2007) presented preschoolers with stories pitting then existing theories against statistical evidence. Each child heard two stories. In one story all the variables came from the same domain. In the other, the psychological cause had a biological effect (feeling scared causing a tummy ache). Three and a half year olds learned only from within domain evidence whereas 4 and 5 year olds learned from cross-domain evidence and were able to transfer their new expectations about psychosomatic causality to a new task. These findings (although from fewer studies) have led to the notion that children entertain a cross-domain interaction model where by they are using non-biological causal explanations to reason about biological processes.

Present Studies

Although studies have examined the role of biological and non-biological factors on biological processes, there have been no studies that have examined children's understanding of the role of a dual causal environmental factor such as skin color on the transmission of a biological process such as contagious illness and on non-biological processes such as social behaviors (environmental factor). The following two studies examine the role of skin color on both the biological process of the contraction of common contagious illnesses and the non-biological process of positive and negative behaviors. Skin color is an interesting factor to examine since it has both biological and social connotations. Although skin color is a biologically derived attribute, the categorical classification of skin is a social construction. Theoretically, skin color should not have an influence on biological processes such as the contraction and development of common contagious illnesses. However, with regard to non-biological processes such as positive and negative behaviors, the social categorization of skin color can influence a person's actions.

Studies on Children's Understanding of Skin Color

Several studies in the developmental literature have demonstrated that young children understand that skin color is a biological attribute that is inherited and stable over the lifespan. Hirschfeld (1995; 1996) found that children reliably selected images of children whose skin color matched that of the adult even though other perceptual characteristics differed. Switched-at-birth tasks have demonstrated that preschoolers tend to match a child's skin color to that of the biological parent rather than the adoptive parent (Gelman & Wellman, 1991; Hirschfeld, 1995; Rhodes, Brickman & Gelman, 2009). Moreover, Hirschfeld (1995) found that young children have a sophisticated theory-like view of racial variation. They believe that racial categories capture non obvious commonalities that go beyond superficial appearances and demonstrate a biologically grounded understanding of skin color.

There has also been a large body of research in the social psychological literature that has examined the impact of skin color on intergroup relationships. Crystal, Killen and Ruck (2008) gave fourth, seventh, and tenth graders scenarios depicting cross-race relations in terms of dyadic friendships, parental discomfort, and peer group disapproval. The results indicated that students with high social contact were more likely than students with low social contact to perceive wrongfulness in race-based exclusion. Margie, Killen, Sinnonad McGlothlin (2005) assessed intergroup attitudes in African-American and non African-American minority children. They found that implicit racial biases emerged when children evaluated ambiguous picture cards. However, there was no racial biases when evaluating

cross-race friendships but children who used ethnicity as judging peers to be similar were less likely to state that cross race dyads could be friends. Feddes, Monterno and Justo (2013) examined subjective social status (SSS) among White and low ethnic status children ages 6-12 years in Portugal. White children favored their ingroup over Black and Roma out groups on the SSS measure, social preferences, and positive and negative trait attributions. The Black and Roma group showed equal SSS preferences and trait attribution for their ingroup and high status White out group but not the other low status out group. With increasing age, White children demonstrated higher SSS for the Black and Roma population.

Although there has been research in the area of social psychology on intergroup relations and in developmental psychology on children's recognition of race as a biological factor, the two studies in this manuscript explore a new angle to this work. First, both studies 1 and 2 test a preschool population, where as the studies that explore intergroup relations have only tested older children. Second, these studies contrast children's attribution of the role of skin color on both biological and social processes, whereas most of the other studies have explored either children's understanding of the stability of race or the impact of race on social relationships. Finally the two studies test the competing theoretical predictions of whether children entertain an autonomous theory of biology or if they entertain a cross-domain interaction model when assessing the impact of skin color on biological and non-biological processes.

Study 1

The main question of interest is whether children think that biosocial factors such as skin color have an impact on the transmission of contagious illnesses. Two possibilities could emerge: (a) based on the Raman (2011) and the Raman and Gelman (2008) cross-domain interaction model, the prediction would be that young children would entertain skin color as impacting the contraction of common contagious illnesses; (b) based on the findings of Kalish (1996; 1998); Siegal (1988); Springer and Belk (1994); Springer and Ruckel (1992), the prediction would be that children would demonstrate an autonomous theory of biology and thus reject the notion that skin color would influence the contraction of common contagious illness.

Method for Study 1

Participants

There were 23 preschoolers (12 girls and 11 boys, M age = 4 years 8 months, range = 4 years 2 months to 5 years 1 month), 17 first graders (10 girls and 7 boys, M age = 7 years, range = 6 years 8 months to 7 years 5months), 30 third graders (18 girls and 14 boys, M age = 8 years 10 months, range = 8 years 5 months to 9 years 11 months), 27 fifth graders (14 girls and 13 boys, M age = 10 years 10 months, range = 10 years 6 months to 11 years 6 months), and 22 college students (19 women and 3 men, M age = 21 years 7 months, range = 18 years to 29 years 1 month). The majority of participants were European American and were from middle-income homes. The children were residents of a small mid-western city and neighboring suburbs. The college students were enrolled in a large public university.

Materials

The main task presented each participant with six contagious illnesses and two non-contagious injuries. The two non-contagious injuries (bruise on head and scraped knee)served as control questions to establish whether children recognized that non-contagious injuries such as scraped knees and bruises are not contagious (see Table 1 for a complete list of items and the mechanisms of transmission for Study 1). Each vignette described a person of a

particular skin color (Asian, African-American or Caucasian) coming into contact with 3 individuals -- one being African-American, on being Asian and one being Caucasian. The three individuals all had the same contagious illnesses and the target person was equally exposed to all three of them. Across all participants, each contagious illness was presented as being exposed to a Caucasian, Asian, or African-American character. An example of one of the vignettes is the following:

Jackie (W) is playing ball with Mary (B), Ann (W), and Helen (A). Mary, Ann, and Helen all have a cold and sneezed on the ball they were playing with. Who do you think Jackie is more likely to get a cold from? (a) Mary (B); (b) Ann (W); (c) Helen (A); (d) her chances of getting a cold from any one of them is the same.Thus across the three versions of the questionnaire, each of the contagious illnesses were being contracted by an Asian, an African-American and a Caucasian.

The presentation of the choice options were randomized for each question with the last option always being "her chances of getting (the illness stated in the vignette) is the same". This option was always presented as the last one to make it less confusing for the younger children. The presentation of the 'same' response as the last option has been used in other studies and it has been shown that preschoolers understand the meaning of the term 'the chances are the same' (Raman, 2011; Raman & Gelman, 2008; Raman, 2005). The presentation of the vignettes was randomized for each questionnaire with the exception of the two noncontiguous illnesses that were always presented first.

Procedure

Children and adults were interviewed individually. They were shown gender appropriate color pictures of the four characters in each of the vignettes (see Figures 1 and 2). The purpose of using pictures was to illustrate the different skin color of the characters in the vignettes, the pictures did not make any reference to the illness or the injuries. The experimenter read the vignettes to the child pointing to the relevant pictures when referring to that particular character. The vignettes did not describe the skin color of the characters. The experimenter pointed to the characters in the vignettes as he/she read the vignettes to the participants. Participants were asked to answer each of the questions and their responses were noted by the experimenter. Participants always received the control vignettes first so that the responses to these questions would not be influenced by the main questions. Only the participants who got both control questions correct were included in the study.

Results for Study 1

The data for the main questions was coded such that when participants matched the target character to the character with the same skin color, it was coded as '1', a match to a character of another skin color was coded as '0', and 'chances are the same' responses were coded as '0.5'. The control questions were coded as correct or incorrect. Only participants who got both the control questions correct were included in the final study. A total of 5 preschoolers were eliminated from the study since they did not pass both of the control questions.

A 5 (age group) x illness ANOVA was conducted to examine participants' responses. The results did not indicate a significant grade effect, $F(4,118) = 1.64$, $p > 0.05$ (see Table 2 for means across grades). However on further inspection of the data, it was clear that there was a sharp change in the use of 'chances are the same' or the '0.5' option. Thus, a chi-square analysis was conducted by counting up how many participants provided the 0.5 option more than half the trials as compared to half or fewer than half of the trials. The results indicated that there was highly significant difference, $p < .001$, with preschoolers using the 'chances are the same option' only 8.6% of the time as opposed to older children and college students who

used it almost 100% of the time (see Table 3 for the percentage of 0.5 responses across grades).

Discussion for Study 1

This study examined if children and adults entertained biosocial factors such as skin color in the origins of contagious illness. The most interesting finding in this study was that preschoolers differed sharply in their reasoning about the impact of skin color on the contraction of illness. Only 9% of preschoolers reasoned that skin color would not have an impact on the contraction of illness, whereas 55% of preschoolers reasoned that there would be a greater chance of contracting a contagious illness from a person of a different race and 36% reasoned that there would be a greater chance of contracting a contagious illness from someone of the same race. The older children did not show any significant differences in reasoning among the skin colors suggesting that they discounted the notion of skin color as influencing the possibility of contracting an illness.

These results suggest that younger children are entertaining a biosocial factor such as skin color when reasoning about the causes of contracting a contagious illness. They are overwhelmingly selecting either the ingroup or the outgroup response but not the 'chances are the same' response. The pattern of responses suggests that they have a general but undifferentiated idea that skin color plays a role in the contraction of illness. These results support the findings obtained by Raman and Gelman (2008) and Raman (2011) where young children entertained psychobiological and psychosocial factors as influencing the probability of contracting a contagious illness. Clearly skin color has a biological component that children seem to associate with another biological process such as illness (even though this is an erroneous association).

However, the question these results raise is why are we seeing evidence of this developmental difference? The first possibility is that due to social desirability reasoning, the older children may be selecting the "chances are the same" option, whereas the younger children are not yet aware of the political overtones of associating skin color with the contraction of illness.

A second possibility is that since contagious illnesses do not manifest themselves immediately after contact, it is often difficult to trace the source of a contagious illness (unless the individual is in contact with the sick person for an extended period of time). Due to the temporal gap between the contraction and manifestation of illness, the older children might not be linking skin color to the transmission of illness.

A third possibility is that due to personal experience and the lack of social desirability responding, the younger children may be selecting responses that reflect their own experience with the contraction of common contagious illnesses. If they associate with peers of their own skin color or of a different skin color (thus having greater proximity with them) and have experienced contracting an illness from them, they might reason that they are more likely to get sick from someone of their own skin color or another skin color. Thus personal experience may play a strong role in preschoolers' reasoning about the role of skin color on biological processes.

A fourth possibility (which is left untapped in the current task) is that preschoolers may be employing underlying biological mechanisms when reasoning about the impact of skin color on the contraction of common contagious illnesses. For example, they might attribute the contraction of an illness to poor hygiene practices, a weak immune system or view the transmission of particular illnesses as being more possible within some skin colors than with other skin colors. Future studies should tap into preschoolers' underlying reasoning by asking for justifications.

The results of this study open up the question as to whether young children think that skin color influences only the contraction of illness or whether it also influences non-biological processes such as social processes. In Study 2, this idea is examined by providing identical vignettes to those of Study 1 except that the vignettes examined the targeting of positive and negative behaviors towards characters of different skin colors.

Study 2

The results of Study 1 indicate that young children judge that overall skin color will impact the probability of the contraction of common contagious illnesses. The question that this leads to is whether preschoolers do in fact demonstrate this bias to non-biological situations. This question was investigated in Study 2 by providing scenarios of positive and negative social behaviors by the target character and asking participants to select which character the target character is most likely to select when implementing these positive and negative behaviors. If participants do not think that skin color influences social behaviors, there should be no difference in their responses regardless of the skin color of the characters in the vignettes, i.e., they should say that skin color is irrelevant in social behaviors. However, if participants view skin color as influencing social behaviors two scenarios are possible. First, we might see evidence of nonsystematic reasoning of the influence of skin color across both positive and negative behaviors. Second, we could see evidence of positive and/or negative behaviors towards certain skin colors as opposed to others. Finally, we might see evidence of skin color not influencing social behaviors.

Method for Study 2

Participants

The sample for this study included 33 preschoolers (15 girls and 18 boys, M age = 4 years 8 months, range = 3 years 3 months to 5 years 6 months); 29 first graders (18 girls and 11 boys, M age = 6 years 11 months, range = 6 years 5 months to 8 years 3 months); 43 third graders (28 girls and 15 boys, M age = 8 years 8 months, range = 7 years 10 months to 9 years 4 months); 36 fifth graders (21 girls and 15 boys, M age = 10 years 6 months, range = 10 years to 11 years 9 months) and 24 college students (20 girls and 4 boys, M age = 23 years 8 months, range = 18 years to 33 years 4 months). The participants were residents of a Midwestern city and primarily European American and from middle-income homes. Adults were recruited from the introductory psychology pool and were given course credit for their participation. None of the participants who participated in Study 1 participated in Study 2.

Materials

Participants received identical vignettes to those of Study 1 with the exception that these vignettes described positive and negative social behaviors. Each participant received a total of 6 vignettes (3 vignettes describing positive behaviors and 3 vignettes describing negative behaviors). Across all participants, each behavior was presented as being exposed to a Caucasian, Asian, or an African-American character. Thus across the three versions of the questionnaire, each of the behaviors were being displayed by an Asian, an African-American and a Caucasian. An example of one of the vignettes of a positive behavior is the following:

> *Jackie (A) is playing ball by herself in the park. There are three girls, Mary (B), Ann (W), and Helen (A) who want to play ball with Jackie. Jackie does not know Mary, Ann, or Helen. Jackie can only pick one girl to play ball with her. Who do you think Jackie is going to pick? (a) Mary (B); (b) Ann (W); (c) Helen (A); (d) she could pick any one of them to play ball with her.*

An example of one of the vignettes of a negative behavior is the following:

> *Jimmy (B) is sitting at camp. There are three boys, George (B), Phillip (W), and John (A) at camp. Jimmy doesn't know George, Phillip or John. Jimmy is upset and starts saying mean things. Who do you think Jimmy will start saying mean things about? (a) George (B); (b) Philip (W); (c) John (A); (d) he could say mean things about any one of them.*

As in Study 1, the presentation of the choice options were randomized for each question with the last option always being "he/she could (direct the positive or negative behavior) towards any one of them". This option was always presented as the last one to make it less confusing for the younger children. The presentation of the vignettes was randomized for each questionnaire (see Table 4 for the complete listing of positive and negative behaviors).

Procedure

The procedure was identical to Study 1.

Results for Study 2

The coding for Study 2 was identical to that of Study 1. Ingroup responses were coded as '1', outgroup responses were coded as '0' and 'chances are the same' responses coded as '0.5'. A 2 trait (positive, negative) x 5 grade (preschool; first; third; fifth; college) repeated measures ANOVA examining the number of ingroup responses revealed a significant main effect for traits, $F(1, 160) = 34.4$ $p < .01$, a significant traits x grade interaction, $F(4, 160) = 2.6$ $p < .04$. Posthoc tests revealed that overall participants made more ingroup matches for positive than negative behaviors (Ms = 1.6 and 1.1 for positive and negative behaviors respectively, $p < .01$). Starting at third grade, participants made significantly more ingroup matches for positive behaviors than negative behaviors (ps< .01 for third grade through college (see Table 5 for means by grade).Preschoolers and first graders however, did not make this distinction, $p > .7$ for preschoolers and $p > .1$ for first graders.

Discussion for Study 2

Study 2 examined the impact of skin color on children's and adults' judgments about positive and negative behaviors. The purpose of this study was to provide a comparison to the results of Study 1 which focused on the impact of skin color on the transmission of contagious illness. The intent was to determine if children applied skin color as impacting only biological processes or if they also thought that skin color affected non-biological processes such as social behaviors.

There were several differences between this study and Study 1. First, in Study 1, only preschoolers judged that skin colors as a whole impacted biological processes such as the contraction of illness. In Study 2, we saw evidence of an increase of positive behaviors towards members of the ingroup from third grade onwards. Third graders, fifth graders and college students associated positive behaviors with a person of his/her own skin color.

Third, the results of this study demonstrate that the results were not due to social desirability reasoning. Indeed, if social desirability had been a factor, we would not have expected to see evidence of older children associating skin color with social development. Instead, we would have expected to see this with the younger group of children.

Taken together, these results indicate that skin color biases are even more pronounced with the older participants for non-biological processes such as social behaviors. Interestingly, this

suggests that preschoolers are selectively applying the biosocial factor of skin color more to biological processes (such as the transmission of illness) than to social processes such as positive and negative social behaviors. This suggests that young children are clearly differentiating the application of skin color to biological vs. non-biological domains.

General Discussion for Studies 1 and 2

The two studies reported in this article, examined the impact of a biosocial factor such as skin color on the biological processes of illness and non-biological process of positive and negative behaviors. From a biological perspective, skin color should not have an impact on the contraction of a contagious illness. If you are sneezed on by someone who has a cold, the probability of contracting an illness should not depend on the skin color of the person who sneezed on you (a point worth noting which might be considered an exception to this is the fact that some illnesses might be associated with certain racial groups and being more likely to be spread among themselves rather than to other racial groups. However, these illnesses are more likely to be of a genetic and not a contagious nature).

There were a few possible explanations for the current set of studies. First, we could have seen evidence of even the youngest children keeping the biological and social domains perfectly distinct, thus negating the effects of skin color on the transmission of illness and social behaviors. If this had been the case, the results would have supported studies that have demonstrated clear domain distinction in the early preschool years (Kalish, 1997; Notaro et al., 2001). A second possibility would have been evidence that supported the cross-domain interaction model (Raman & Gelman, 2008; Nemeroff, 1995; Raman & Winer, 2001) where participants would reason that skin color influences the contraction of contagious illnesses but not on social behaviors or vice-versa. Studies have demonstrated that even adults entertain social factors as influencing the contraction of illness. Thus, it would not be unreasonable to expect children to demonstrate similar reasoning. A third possibility is that we could have seen a generalized pattern of skin color affecting both the biological process of the contraction of contagious illness as well as social behaviors. These results would have suggested that participants are not subscribing to any particular type of reasoning.

In the present set of studies (with the exception of preschoolers), all other participants clearly reasoned that skin color would not have an effect on the contraction of contagious illnesses. This argues for the notion that young children expect a biosocial factor such as skin color to have an impact on biological processes. However, when it came to judging the impact of skin color on non-biological processes such as social behaviors, there was evidence to the contrary where in fact older participants judged that skin color would impact behaviors but preschoolers did not entertain skin color as impacting social behaviors. In this case, preschoolers kept the biological and social domains perfectly distinct. Given this pattern of results, where preschoolers judged that skin color would affect only the contraction of illness, it might be reasonable to conclude that preschoolers view skin color more as a biological rather than a social attribute.

These findings might seem surprising given the fact that we might have expected young children to judge that physical appearances such as skin color to influence social behaviors. After all, by the preschool age, children experience positive and negative behaviors from their peers and siblings so why is it that we are not seeing any evidence of skin color impacting social behaviors in the preschool age group? One possible explanation for this is that, preschoolers do experience positive and negative behaviors from their peers but children view these behaviors are based more on the personality of the child and not on the skin color of the child. So young children are either nice or mean to other children based on the behaviors and personality of the other children and not on their skin color. It might even be based on other aspects of physical appearance such as attractiveness (Langlois, Roggman, & Riesner-Danner,

1990) and weight but skin color does not seem to influence children's judgments at this age. It might take several repeated experiences with members of a certain racial group before certain stereotypes set in.It is only when children are older do they seem to recognize that physical appearance such as skin color can impact a person's behavior towards others.

The question that these results raise is, why do young children subscribe to the notion that skin color in general affects the contraction of illnesses but that skin color does not affect social behaviors? There are a couple of possible explanations for this. First, young children may infact be making the association that skin color impacts the contraction of illness (although erroneously) because they both have biological origins to them. Thus, they might be viewing skin color purely as a biologically stable factor as suggested by studies that have examined children's understanding of the transmission of race (Hirschfeld, 1992).A second possibility is that children are sensitive and appreciate the distinctions between the biological and social domains but as evidenced by the fact that they selectively applied the notion of skin color as impacting the contraction of illness but not affecting social behaviors. A possible explanation for this is that sometimes one domain (in this case skin color) inappropriately encroaches upon the other (the transmission of illness) (Coley 1995; Heyman, Phillips & Gelman, 2003; Opfer, 2002; Raman & Gelman, 2008; Raman, 2011). For example, Raman & Gelman (2008) found that up to second grade, children entertained psychosocial relatedness (whether liking or disliking a person influences the probability of contracting an illness) as influencing the contraction of illness but not influencing injury transmission. Similarly, Heyman et al., (2003) found that 5-year-olds showed systematic tendencies to take animacy into account when making predictions about the principles of physics (predicting that a path an item takes will differ, depending on whether it is animate or inanimate (Raman & Gelman, (2008)). Raman (2011) found the psychobiological factor of the "yumminess" or the "yuckiness" of a food as affecting the biological process of growth but not illness, with children reasoning that foods perceived as "yummy" would have more of an impact on growth than if the same food was perceived as "yucky". These findings parallel the findings of the current two studies where the biosocial factor of skin color was inappropriately judged to impact the biological but not the social domains by the youngest children.

The question that these results raise is whether we can conclude that children strictly do not have an autonomous theory of biology. Once could argue that children recognized the biological origins of skin color and thus are erroneously associating skin color as affecting other biological processes such as illness. This could suggest that young children do have a fragile theory of biology where they seem to link biological causal factors for biological processes.

One unresolved issue is the challenge of trying to predict in a systematic manner when young children will make these erroneous cross-domain associations and when in fact they make clear domain distinctions. Several studies have demonstrated that the biological domain is one in which children seem to demonstrate cross-domain reasoning as well as domain distinct reasoning (Kalish, 1997; Notaro et al., 2001;Raman & Winer, 2002; Raman & Gelman, 2005; Raman & Gelman, 2008; Raman, 2011). A possible explanation for why we seem to see more evidence of this cross-domain reasoning in the biological domain (especially when it concerns that transmission of illness) is that young children are still learning the extent of domain boundaries and thus employing personal and social experiences when making these associations. There are infact several scenarios where non-biological factors such as psychological factors can influence the contraction of illness. Thus, it may not to be too surprising that young children entertain skin color as impacting the contraction of illness.

One potential criticism of these results could be that the older children are showing social desirability reasoning for Study 1 and thus we are not seeing any evidence of skin color influencing the contraction of illness. However, social desirability is clearly not a factor that is influencing the results, as in Study 2 it is the older (not younger) children who are responding

that skin color has an impact on social behaviors. If social desirability reasoning was an issue, we should not see evidence of the influence of skin color on social behaviors. If anything, my prediction would have been that participants would have been more cautious about attributing skin color to social behaviors than biological processes, since social behaviors are within an individual's control. The results proved to demonstrate an opposite trend, with skin color influencing social behaviors less for the younger children than older children.

There are a few directions for future research. First, studies should include participants from minority racial groups or mixed racial groups to determine if the participants' skin color has an impact on their judgments. Second, the underlying mechanisms that children are using to arrive at their conclusions should be investigated. This will inform us as to why young children think that skin color influences the contraction of illness but not social behaviors. Third, it would be interesting to investigate adults' judgments about skin color on more complex biological processes such as blood transfusions or organ donations from people of other skin colors to determine if people think that skin color plays a role in more complicated medical decisions. Fourth, it would be interesting to conduct a study to reduce demand characteristics by asking children to select and endorse a response after hearing different viewpoints about the impact of skin color on biological and social processes (Hejmadi, Rozin & Siegal, 2004: Raman & Winer, 2004).

The results of these two studies clearly illustrate that young children selectively judge that skin color in general influences biological but not non-biological processes arguing for the notion that important developmental changes are taking place between the preschool and middle childhood years as to how children come to appreciate and understand the biological and social domains. Young children are still working out how the biological and social domains interact arguing for the notion that their recognition of the biological domain is somewhat frail. In contrast, older children demonstrate a far more robust appreciation of the biological and social boundaries when reasoning about the impact of skin color on biological and social behavior.

Table 1: Contagious illnesses and mechanism of transmission for Study 1

Contagious Illnesses	**Mechanism of transmission**
Cold	Sneezed on the ball
Cough	Coughed all over the block
Sore throat	Shared drinks
Pink eye	Shared tissue
Fever	Hugging
Skin rash	Touched
Control Items	
Scraped knee	Falling
Bruise on the head	Hugging

Table 2: Mean responses by grade for Study 1

Grade	**Means**
Preschool	2.4 (1.7)
First	2.8 (1.0)
Third	2.9 (0.3)
Fifth	2.9 (0.4)
College	3.0 (0.2)

( ) indicates S.D.s

Table 3: Percentage of 'chances are the same' responses across grades for Study 1

Grade	>50% of the time	<50% of the time
Preschool	5	95
First	72	28
Third	84	16
Fifth	96	4
College	100	0

Table 4: Positive and negative behaviors used in Study 2

Positive Behaviors	Negative Behaviors
Play ball with	Saying mean things
Asks for help	Someone broke the vase
Share carrots	Does not want him to sit with him

Table 5: Means for positive and negative behaviors across grade for Study 2

Grade	Positive Behaviors	Negative Behaviors
Preschool	1.3 (0.9)	1.2 (0.9)
First	1.3 (1.0)	1.0 (0.8)
Third	1.6 (0.8)	1.1 (0.8)
Fifth	1.8 (0.7)	1.1 (0.6)
College	2.0 (0.6)	1.1 (0.5)

Figure 1: Pictures used for female characters in the vignettes

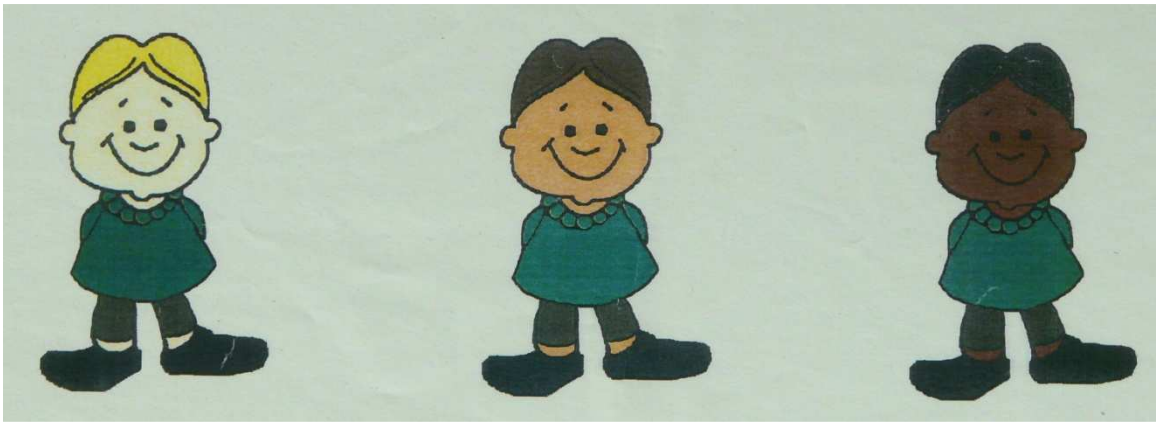

Figure 2: Pictures used for male characters in the vignettes

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