Forbidden or Promising Fruit? An experimental study into the effects of warning labels on the purchase intention of digital gamers

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ABSTRACT
Using a forced choice paradigm, in a 2 (age: -18, +18) x 4 (label: no label, 18+, violence label, extreme label) x 2 (cover type: soft, hard) mixed factorial design, this study was able to experimentally show the effects of warning labels on the preference of game covers. Warning labels made these game covers more desirable. This effect was only found for subjects of minor age (12 to 17 years old) and for adult subjects (aged 18 and more). No difference was found in effects of evaluative or descriptive ratings: both age label and content label had the same attracting effect on game covers. Given these results a revision of the process behind the forbidden fruit effect and the role of reactance in it, seems in order.

Keywords
Digital gaming, warning labels, attraction, forbidden fruit, promising fruit, experimental design

INTRODUCTION
Whether video games have a negative effect on young people has caused a lot of debate over the years. Researchers search for nefarious effects of gaming on the behavior of people to find out whether video games are indeed a just cause for concern for parents. Meanwhile regulators worldwide have not stood by idly and have called into life systems of warning labels on video game products. These labels are to inform consumers and parents of consumers for which age these games are suited and if they contain any content such as drugs, sex or violence. In Europe there is the PEGI system (Pan European Game Information) which puts various labels on game covers, in the US there is the ESRB (Entertainment Software Rating Board) system. Launched in 2003 the PEGI system is adopted by almost every country in the EU. However, the efficacy of these labels has yet to be shown in scientific research. Although the purpose of these labels is to inform parents or other possible consumers if the product is suited for their child, it could also serve another purpose, i.e. function as a source of information for young

gamers indicating what kind of game they are dealing with and convince them to buy and play the game.

In 1996, Bushman and Stack published an article [1] in which they warned that labels for violent television programs could have the adverse effect that, rather than deter vulnerable viewers, they could attract additional ones. In a meta-analysis across media Bushman and Cantor [2] raised the question if content and age labels do more to attract than to repel media-users. They found a small effect showing that ratings and descriptions of mature content attract male youngsters between the ages of 11 and 22. In a subsequent investigation Bushman [3] showed that content warning labels made descriptions of violent TV programs more attractive to watch as opposed to the same descriptions with information or no labels. The authors did not apply any labels to non-violent content descriptions however. In a more recent article Bijvank et al. [4] found evidence that both age and violent labels make video games more attractive to players. Participants had to read 12 descriptions of video games with either an age or a violent content label beneath it and indicate on a scale how much they wanted to play each game. Half of these descriptions were descriptions of violent video games, the other half was non-violent. For the age labels (7+, 12+, 16+, etc.) they found that participants wanted to play the video games with more restrictive labels the most. Violent content labels also made the games more attractive to play as opposed to a non-violent label or no label at all.

Cited research proposes a forbidden-fruit hypothesis which posits that something that is forbidden will be more attractive to attain. The forbidden-fruit hypothesis is deduced from reactance theory [5], originally proposed by Brehm in a medical context where patients refused treatment. Psychological reactance is an unpleasant emotional state experienced when someone is denied something and perceives this as a threat to their individual freedom. This emotional state will motivate them to reclaim this denied element with even more vigor and willingness than before. Accordingly, the forbidden-fruit hypothesis posits that age and content labels will increase interest in these labeled games, the opposite effect of what was aimed for by regulators.

An alternative explanation, however, which we would like to explore in this study, is that the labels can simply function as indications of attractive content. As Bushman and Cantor [2] wrote: "Ratings may serve as a convenient way to find such [mature] content". Hence appealing effects from labels on video games could not only stem from the label itself but rather from the change in perception of content of these games. Labels could signal players that these games contain interesting content, making them more attractive to play. Consequently we could call this a "promising-fruit effect" as labels give us a sneak peek at what is inside a video game and what kind of content can be expected.

Research Question 1
We aim to replicate the effects found in Bijvank et al. [4] but expect to find additional effects in accordance with the promising-fruit hypothesis. In this study we use both an age label and a content label. Sometimes these labels are divided in two types of ratings: evaluative and descriptive ratings. Consistent with the meta-analysis by Bushman and Cantor [2] and the results of the study by Bijvank [4] we expect that, if there is an effect of label, both kind of labels will have an effect. Reactance theory is not able to support these results because evaluative age labels should be experienced as more of a restriction than descriptive content labels. Another question we would like to explore is that according to the forbidden fruit hypothesis games with 18+ age labels should no longer be more attractive to participants of age, since the age labels do not impose a restriction

to play these games anymore. If a positive effect of age labels on people of age is still found, this must mean there is more to labels than their own effect/value. Therefor the sample of this study included both minors (12 to 17 year old) and adults (+18 year olds).

Research Question 2
In this study we use two types of content for the covers and we make a distinction between soft and hard covers. The soft covers have a friendlier and more childish look (e.g. a panda pushing a soap bubble or a cartoon version of red riding hood), whilst the hard covers emanate a more serious, darker air (e.g. an ominous alien creature looming over a half-destroyed city or a band of warriors ready to fight). The manipulation of this cover-type allows us to make additional hypotheses. If labels do indeed influence perception of game content we can expect a negative effect of violence labels on the perception of soft, non-violent games because violence is unwanted or unexpected in this type of games. To further explore this negative effect of labels on soft games, we added a self-made non existing label to the experiment. We wanted this label to be extreme and convincing in that it represented mature and extreme content. We might expect a similar to other labels or even heavier effect of this extreme label.

Building further on the study by Bushman [3] and Konijn [6] where written descriptions were given to the participants with labels above or underneath, we wanted to have more realistic stimuli. Therefore we used non-existing game covers that looked convincing. These stimuli give the experiment more ecological validity as they reflect a more realistic situation in which a person browses videogame covers in a store.

In order to measure preference for certain covers we opted for a two-alternative forced choice task in which participants are presented with pairs of stimuli of which they have to choose one. Provided all combinations of all stimuli are presented (soft/ hard covers with no label / +18 label / violent content label and extreme label) to each subject, it is possible to deduct preference for game covers and thus effects of labels, using the principles of Thurston's [7] law of comparative judgment. We believe that this approach gives us more valid preference data than letting subjects rate the game covers on a scale, since their preference of a single cover is measured time and again as all possible combinations of covers are considered. Choice data might prove to be a more objective measure as opposed to the subjective nature of questionnaires.

Furthermore, we measured trait aggressiveness and reactance to see if people with high scores on these personality traits show a stronger effect of labels or not. We used the same items as Bijvank et al. [4] as we wanted to see if we could replicate their effects. They have found that reactance and trait aggressiveness moderated the effects of the warning labels, making video games with labels more attractive for subjects high in these traits.

An eye tracker was used as an additional measure. We were interested if eye fixations and movements could tell us more about the decisions in the choice task: did subjects fixate every cover they chose and how long? Were labels presented on the stimuli fixated by the subjects? When writing this paper, analysis of the eye tracking data was still under way, so we could not implement it yet.

METHOD

Design and Manipulations
This study had a 2 (age: -18, +18) x 4 (label: no label, 18+, violence label, extreme label) x 2 (cover type: soft, hard) mixed factorial design. The first factor was a between subjects factor, the other two factors were within subjects factors.

Participants
Participants (41) for this study were recruited through personal recruitment in a local multimedia store or through social media. Twenty subjects were minors with an average age of 14.55 ($SD = 1.86$) and 21 were adults with an average age of 22.19 ($SD = 3.06$). The minor subjects consisted only of children going to high school, while the adult subjects were mostly students.

Procedure
Participants were welcomed and seated behind a computer. First participants were asked to fill in an informed consent form and some questions measuring socio-demographics. Instructions were given about the task and the eye tracking procedure. Participants were asked to choose the game they would rather buy or prefer to play. The eye tracker was calibrated, set to record and the choice task was started. After a practice block of 10 trials, the actual test trials started with different stimuli. Two blocks of 120 trials were administered and participants were able to take a break between blocks. Stimuli pairs were presented for 5000 ms, if no response was detected during this period, the next trial began and the trial was considered as a timeout. Between trials a fixation cross was presented for 500 ms in order to "reset" eye fixation to the center of the screen.

After the task, participants were asked to fill out a questionnaire. The six covers used in the experiment were presented and subjects were to state if they would buy the game on a 5 point Likert scale. In the next part of the survey, subjects responded to 17 items (consisting of the Reactance and Trait Aggression scales). Finally participants were asked if they recognized the warning labels used and knew their meaning and whether they felt that these labels had influenced their decisions in the choice task and in real life when buying games. Subjects received their monetary compensation and were thanked.

Apparatus
The forced choice task was presented on a Tobii1750 eye tracker which also served as a monitor. The task was programmed in OpenSesame [8].

Materials

Game covers
Stimuli were 10 non-existing game covers created by taking fitting images and putting a PlayStation 3 banner on the side and the Sony logo in the bottom right corner. Four of these were used in the practice phase of the experiment and were not repeated during the actual testing phase. These four practice stimuli all had the same label on them, one which was not used during the testing phase.

To ensure no effects of visual attractiveness influenced decisions in the choice task a preliminary study was performed on 21 subjects (13 male/ 8 female). They were shown

Cover	Mean Attractiveness	Standard Deviation	Mean Violence	Standard Deviation
Cover 1	2.90	1.04	4.52	.51
Cover 2	2.71	1.15	2.62	1.16
Cover 3	2.81	1.29	4.19	.68
Cover 4	3.05	1.16	1.67	.58
Cover 5	3.43	1.17	3.95	.50
Cover 6	3.29	1.31	4.67	.58

Table 1: Visual attractiveness and violence ratings of preliminary study

the 6 covers used in the test phase and asked to rate their visual attractiveness and potential to contain violence. No significant differences in visual attractiveness were found ($F(5,15) = .98$, $p = .437$) so we could assume all covers were equally visually attractive. On the other hand differences in possible violence content were found ($F(5, 15) = 3.79$, $p < .005$) and two covers were rated as containing less violence than the other four when using a cut-off at the mean ($m = 3.60$). Cover 2 and 4 where therefore considered as soft for the Cover Type variable, the others as hard.

The 6 game covers used for the test were presented with 4 types of labels (none, +18, violence, extreme) making 24 possible stimuli. Using a two-alternative forced choice task every stimulus had to be presented in pairs with the other stimulus, withholding pairings of the same stimuli. Stimuli were presented 340 pixels to the left and right of the center of the screen and were 600 x 710 pixels in size. Pairs of stimuli were only presented once, taking into account balancing of stimuli presented left or right.

Figure 1: Two covers used in the experiment: a soft cover (left) and a hard cover (right).

Labels

The +18 and violence labels were the official PEGI labels used for video games in the EU. The fictive extreme label was a skull and bones image with the PEGI URL-banner underneath. These labels were presented in the same spot in the bottom left corner of the game cover where it is also found on real game covers. Content labels such as the violent content label are normally shown on the backside of the game but since we only show the front side of the game covers, we decided to put these on the front as well. Every label had the same size.

Measures

In the post-questionnaire 17 items were presented on a 5-point Likert scale. 9 items were the Physical Aggression subscale of the Buss & Perry aggression questionnaire [9]. The other 8 items came from a shortened version of the Therapeutic Reactance Scale [10]. All items were translated in Dutch and were the same items used in the study by Bijvank et al.[4].

RESULTS

Scale validity

Looking at our post-test measures we notice that our Reactance scale has a low reliability (Cronbachs α = .50) with no improvement possible by discarding items. This forces us to refrain from using the scale in further data-analysis. The trait aggressiveness scale does have an acceptable reliability (Cronbachs α = .78) and we opt to implement this variable as a factor in our model. Means for Aggression in both age groups did not differ significantly ($F(39) = .89$, $p = .35$).

Choice data

A Poisson regression with a loglinear link function was performed with the number of times a cover was chosen as dependent variable. Age (12-18 versus 18+), Label (none, 18+, violence, extreme), Cover Type (soft versus hard) and Trait Aggressiveness were used as predictors in this model.

Figure 2: The PEGI 18+ and violence label, the fictive extreme label and an example of a cover with a label.

Factors	Wald Chi-Square	df	Significance
Age	12.94	1	< .001*
Cover Type	1196.74	1	< .001*
Label	18.21	3	< .001*
Trait Aggressiveness	5.70	1	< .05*
Age * Cover Type	32.89	1	< .001*
Age * Label	7.99	3	< .05*
Cover Type * Label	10.49	3	< .05*
Age * Trait Aggressiveness	6.14	1	< .05*
Cover Type * Trait Aggressiveness	8.88	1	< .005*
label * Trait Aggressiveness	2.19	3	.54
Age * Cover Type * Label	3.03	3	.39
Age * Cover Type * Trait Aggressiveness	11.15	1	< .005*
Age * Label * Trait Aggressiveness	.10	3	.99
Cover Type * Label * Trait	.84	3	.84

Table 2: Tests of model effects

Main Effects
Main effects of Age (χ^2 (1) = 12.94, $p < .001$), Label (χ^2 (3) = 18.1, $p < .001$), Cover Type (χ^2 (1) = 1196.74, $p < .001$) and Trait Aggressiveness (χ^2 (1) = 5.70, $p < .001$) were significant. Main effects of Age and Trait Aggressiveness on the choice data are not particularly meaningful for our purposes. Looking at the results for Age, the minor subjects had more timeouts during the computer task than the adults. The main effect of Trait Aggressiveness is that the subjects with a high score on Trait Aggressiveness tended to have fewer timeouts. The main effects of Cover Type and Label were explored with pairwise comparisons. Every pairwise comparison in this paper was performed with a Sidak correction for multiple testing. Overall subjects preferred the hard covers and chose them more often than the soft covers (Mean Difference (I-J) = 7.95, $p = < 0.001$). Results for pairwise comparisons of label types can be found in table 3.

Covers with the violent content label were chosen the most by subjects, second most were covers with the 18+ label, followed by covers with the extreme label and finally the no-label condition.

(I) Type label	(J) Type label	(I-J) Mean Difference	Standard Error	df	Sidak Significance
none	+18	-.79	.30	1	.05*
none	violence	-1.18	.30	1	.001*
none	extreme	-.36	.29	1	.78
+18	violence	-.39	.30	1	.73
+18	extreme	.43	.30	1	.62
violence	extreme	.82	.30	1	.038*

Table 3: Mean differences between labels.

Interaction effects

Whilst hard covers where preferred over soft covers, there was an interaction effect of Cover type by Age. Minor subjects had an even more explicit preference for hard type covers (Mean Difference (I-J) = 8.83, p = < 0.001) than the older group (Mean Difference (I-J) = 7.59, p = < 0.001). Furthermore, Age interacted with preference of label. Minors chose significantly less for the no label condition compared to the violent content and +18 labels (p < .001) and compared to all label conditions of the adults (p < .05).

Soft covers with the +18 label on it were chosen more than the no-label condition (Mean Difference (I-J) = 1.31, p = < 0.005), meaning that only the 18+ label was able to make a soft cover more attractive to subjects.

Effects of Trait Aggression

The Age x Aggression interaction has one implication: adults high on trait aggressiveness had the tendency to have less timeouts (Mean Difference (I-J) = 1.35, p = < 0.005) . Trait Aggression does seem to affect the preference between soft and hard covers. Subjects high on trait aggression choose more soft covers than subjects low on trait aggression (Mean Difference (I-J) = .71, p = < 0.05).

A three-way interaction between Age, Type Cover and Trait Aggressiveness is significant (χ^2 (1) = 11.15, p < .005). Trait Aggression only has an impact on the preference of soft covers by adults, not by minors. Adults high in trait aggression chose soft covers significantly more than those low in trait aggression.
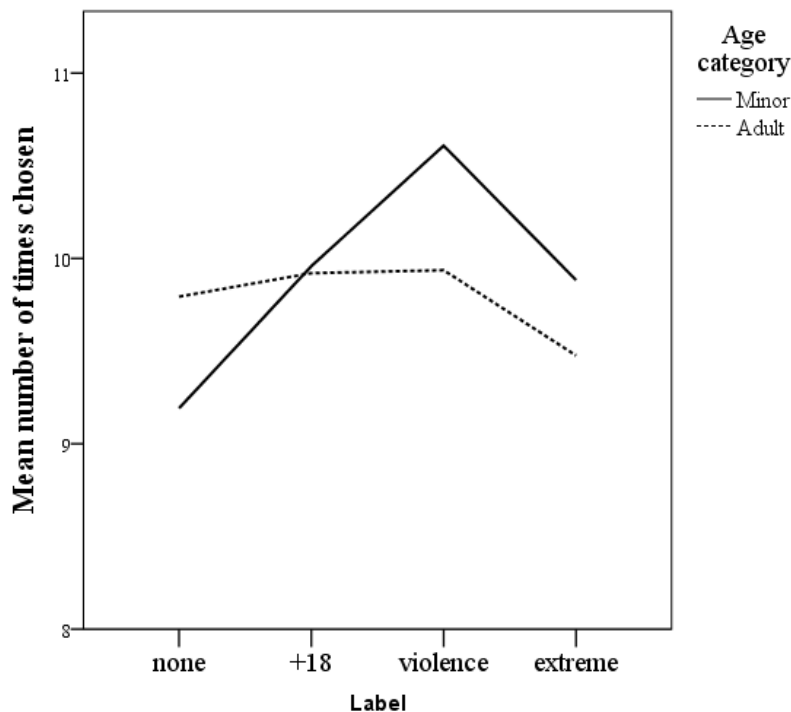

Figure 3: Mean number of times a cover was chosen by label condition and age category

DISCUSSION

Labels
Our results show that warning labels had a positive effect on the attractiveness of covers. Overall, covers with the violent content label and +18 labels were chosen more than covers with the extreme label or no label at all. Only these mean differences were statistically significant, so it seems that, overall the violence and +18 labels had a more enticing effect than the extreme and no label conditions.

An important result of this study is that minors have a preference for the violent content labels over no label at all. Moreover adults chose any cover with any label on average more than minors chose a cover with no label at all. This might mean that minors have a preference of "any" label, without regard of which type of label it is. Unfortunately the mean differences between no label condition and +18 label condition and between no label condition and extreme label condition were not significant, so we need more evidence to support this theory. Nonetheless, paired comparisons between label conditions for adults showed no significant differences between them. Do labels really have no effect on the attractiveness of covers for adults?

Delving further into this result we create a new variable Label / No Label to see if indeed some effects of label can be generalized to effects of presence of a (non-specific) label. Another Poisson regression with a loglinear link function was performed with the number of times a cover was chosen as dependent variable.. Age (12-17 versus 18+), Label (label versus no label), Cover Type (soft versus hard) and Trait Aggressiveness were used as predictors of this model. The same main effects and two-way interaction effects were found as with the regression model using the original Label predictor, only the main effect of Trait Aggression differed and was not significant (χ^2 (1) = 1.86, p = .172).
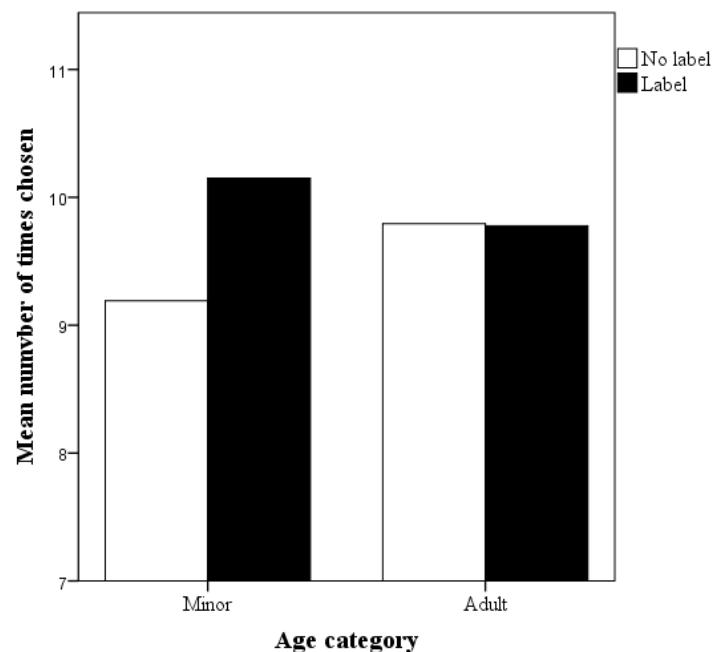

Figure 4 : Mean number of times a cover was chosen by label condition and age category

Looking at the Label x Age interaction (χ^2 (1) = 7.05, $p < .05$) we notice that there is no difference between label and no label conditions for adults, confirming our beliefs that labels had no effect on the preference of adults. For minors the effect of label still stands, covers with a label were chosen more than covers with no label (Mean Difference (I-J) = 1.41, $p = < 0.001$).

Our first research question considering the forbidden fruit hypothesis is answered right here. We see the forbidden fruit hypothesis confirmed as labels no longer had an effect on the preference of game covers for adults. Our promising fruit hypothesis is disproven, because according to that hypothesis labels should continue to have an effect on game covers, even with adults. We would like to stress that taking the forbidden fruit hypothesis strictly, only age labels should stop being effective for adults. We actually found that the violent content label also lost its effect. Furthermore, both the +18 as well as the violent content label had a similar attracting effect on the video game covers. These results are in line with those by Bijvank [4] in that age label and content label have the same effect. This means that reactance theory is perhaps not the only driving force behind the attraction to games with warning labels, as the 18+ label should have been experienced as more of a restriction of freedom than the content label. A more nuanced view of the forbidden fruit hypothesis is necessary. The emotional state of reactance might not be the only underlying process. Given that content labels are also able to elicit a "forbidden fruit" effect it might be that both these content labels, as well as age labels are appealing because the labels give an indication of what kind of game minors are dealing with. Both types of labels tell minors that these games contain possible unsuited content. Knowing that, a forbidden fruit effect arises and these games become more attractive to play and buy.

The fictive extreme label seems to have no significant effect on the choice of covers. We see two explanations. The label was not known by subjects, since it was fictive, and therefore ineffective. Or the participants of this study saw through this manipulation and realized this label was out of place, so it did not tell them anything about the content of the game. In the post-test questionnaire data subjects reported on average to know the extreme label less than the 18+ ($t(40)$ = -4.31, $p < .001$) or extreme content label ($t(40)$ = -4.07, $p < .001$). Looking at the answers given to the question "What does this label signify?" those that did answer or guess (N = 15) mostly thought the label signified the presence of death in the game. Only three of the subjects answered differently and thought the label referred to a poisonous effect the game might have. It seems that the first explanation, the label is not known by subjects, is a more plausible explanation than participants seeing through the manipulation of this label.

Cover type
Overall, hard cover types were more attractive to choose than soft cover types. Taking into account the age categories, it becomes clear that for minors the difference between chosen hard and soft covers is even greater than the same difference for adults. Adults chose soft covers relatively more often than minors did.
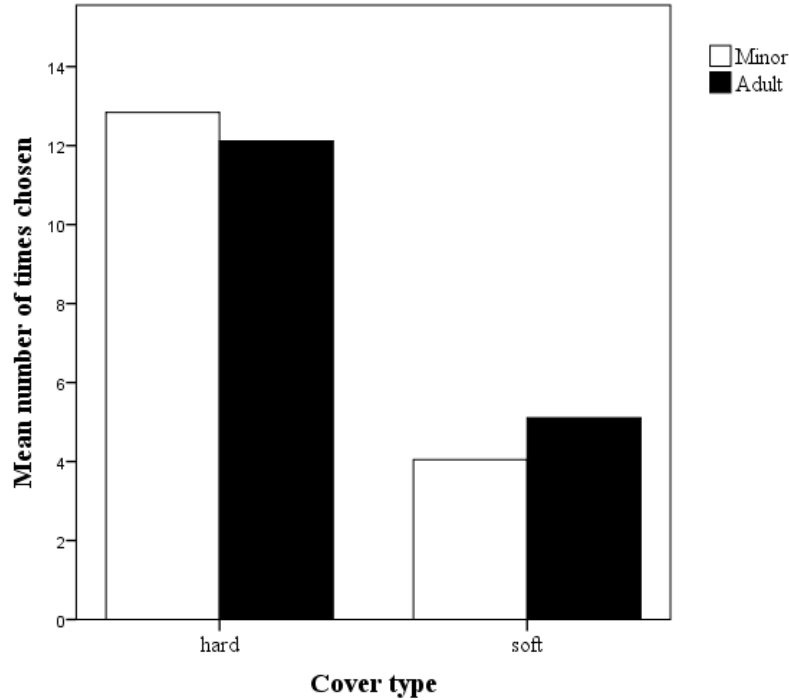
Figure 5 : Mean number of times a cover was chosen by cover type and age category

This preference for hard type covers is quite clear, both adults and minors felt more drawn to the more violent looking covers. Why these violent covers, and in extension violent games, are preferred is subject to research in many studies. One of the possible explanations is given by Jansz [11] stating that violent video games serve as a laboratory to explore emotions en emotional situations. The freedom these games offer to explore asocial behavior and act without boundaries is attractive.

But did labels have an effect on the perception of cover type? Looking into the interaction of Cover Type and Label we find that for hard covers the labels did not make any difference. For soft covers, on the other hand, we find that the violent content label made soft covers more attractive than soft covers with no label. Once again we did not find any other significant differences between labels, leading us to inspect the question with the model containing the Label / No Label variables.

The Cover Type x Label interaction is significant (χ^2 (1) = 7.02, $p < .05$) and pairwise comparisons show us that labels only had a significant effect on the preference of soft covers and not on the preference of hard covers. Labels did not cause subjects to choose differently when picking hard type covers (Mean Difference (I-J) = -.23, $p = .94$).
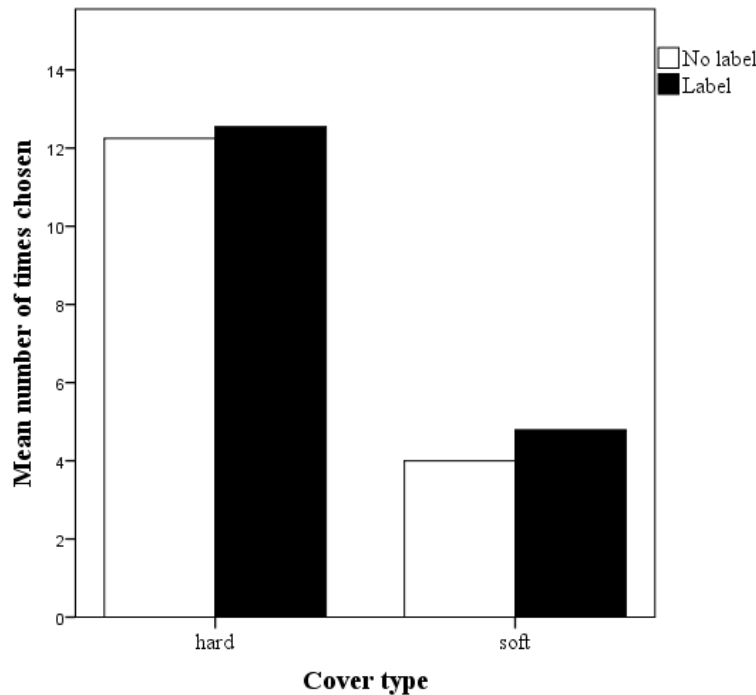
Figure 4 : Mean number of times a cover was chosen by label condition and cover type

Trait Aggression

Subjects high in Trait Aggression tended to choose soft covers over hard covers. The three-way Age x Cover Type x Aggression interaction brings to light that this effect is only applicable to adults. Adults high in trait aggression chose soft covers more than adults low in trait aggression. This result seems rather counter-intuitive. A guess could be that perhaps these subjects realize they have a more aggressive nature and try to hide this by implicitly choosing more soft covers. This all seems a tad farfetched however. We would like to investigate this question further and perhaps more subjects (and power) will make this effect more clear or perhaps will even remove it.

We would like to point out some weaknesses of this study and offer some ideas for future research. Previous research on warning labels [12] has found that vividness enhancing characteristics have a positive effect on getting the attention of people. Although realistic, the +18 age label is, arguably, more bright and vivid than the other warning labels. A test where visual attractiveness of labels is objectively rated could maybe be in order. Nonetheless most effects were observed when the violent content label was displayed and not when the 18+ label was displayed, even though the natural location of the violent content labels is on the back of a videogame box.

Ultimately the goal of warning labels is to influence behavior of people. A meta-analysis by Cox and colleagues [13] indicates that warnings can indeed influence behavior. The ultimate test to prove efficacy of warning labels is therefor to see if subjects show behavioral compliance after viewing these labels [14]. Creating a valid experiment that measures behavioral compliance to warning labels on video games seems difficult and perhaps even not that interesting because these labels exist to inform parents about possible unsuited content. As Argo and Main [15] suggest, recall of the information the

warning labels try to convey, is perhaps a more fitting measure of efficacy since the goal of many warning labels is to warn and not to prevent.

Still, a more real to life experiment in which subjects choose game covers in a simulated shopping environment might have more ecological validity but would be hard to control for confounds.

Finally, we give some perspective about warning labels on video games in general. PEGI itself states on their website [16] that "until today there is no evidence that playing violent video games causes any long-term or lasting increase in aggressiveness or violence among players". Therefor the question remains if these warning labels are truly necessary and which authority gets to decide which label goes on which game. For example Funk [17] found that a commercial rating system and ratings by consumers diverged for games in which cartoon characters perform violent actions. Consumers, both adults and children, tended to rate these games as violent whereas they do not get a violent content rating by the commercial system. An Aladdin game for example got a General Audience rating (suited for everyone), whilst half of the consumers tested, categorized this game as violent. If ratings do not seem to reflect the true concerns of consumers, they should maybe be reevaluated or the whole system perhaps revised. Ultimately, a rating system should not be a reflection of current morals or standards but a genuine, unbiased system that protects children from unsuited content. Since effects of video games and their content on children are not clear at all, game ratings have a very difficult function to fulfill. Finding the right system is a balancing act between what we (want to) believe is right and unbiased research on the topic of videogame ratings.

CONCLUSION
We managed to show the effects of warning labels on video games with an experimental design. Instead of using questionnaires, a design with an objective measure of choice data gave us similar results as the study by Bijvank and colleagues [6] and more. We found an effect of warning labels on the desirability of video games and show that this effect is only valid for minors (12 to 17 year olds). The adult group (+18) was not affected by labels. Both age label and content label had the same attracting effect on game covers. Given these results a revision of the process behind the forbidden fruit effect and the role of reactance in it, seems in order. The role of trait aggression in this study is an uncertain one. Most effects do not have grave implications but the one that does matter, the interaction of aggression with age and cover type, has a counter-intuitive effect. Adults high in trait aggression prefer soft covers more than adults low in trait aggression. More research will have to be done, in order to explain this effect. Finally hard covers were generally found more attractive than soft covers in both age groups and this difference was quite large. It seems that hard looking covers, perhaps with a promise of violent content, have an inherent quality that makes gamers, young and old, want to play them. The paradigm used to measure game cover preference looks promising for future research, which should try to focus on closely examining the effects found in this study.

ACKNOWLEDGEMENTS

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