

Behavioral genetics in Polish print news media between 2000 and 2014

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Summary

Aim. The aim of this paper is to describe how Polish print news media frame relations between genetics and human behaviors and what images of behavioral genetics dominate in press discourse.

Methods. A content and frame analysis of 72 print news articles about behavioral genetics published between 2000 and 2014 in four major Polish weekly magazines: “Polityka”, “Wprost”, “Newsweek” and “Przekrój” was conducted.

Results. Twenty one different behaviors were mentioned in the sample and six major analytic frames were identified: essentialist, materialistic, deterministic, probabilistic, optimistic and pessimistic. The most common was the tendency to describe human behaviors in terms of genetic essentialism, reductionism and determinism, as almost one half of the articles was focused solely on genetic determinants of human behaviors and lacked any reference to poly-genetic and/or environmental conditioning. Although most of the articles were balanced in tone, benefits were stressed more often than potential risks. Stories that confirmed existence of genetic determinants of human behavior were favored over those that did not. One third of the articles stressed the social or ethical consequences of the development of behavioral genetics.

Conclusions. The complex and abstract character of genetic knowledge results in a simplistic portrayal of behavioral genetics in the press, which may lead to a misunderstood interpretation of the complicated interplay between behavior, genetics and environment by the public. Consequently, print news media contribute to geneticization of behaviors. It is important to improve the quality of science reporting on behavioral genetics and to educate researchers how to communicate with the media more effectively.

Key words: behavioral genetics, geneticization, print news media

Introduction

For the last couple of decades the importance of the media for social dissemination of scientific knowledge in the field of medicine, genetics, health and illness has increased [1, 2]. The role of the media in shaping the knowledge and attitudes of the public is best exemplified in the case on mental disturbances [3, 4]. Such an observation is confirmed by the studies that show that individuals for whom the media constitute the main source of information about mental illness more often than people from other groups, believe in the recovery of mental patients [5]. Also an observation that patients stress that in the media they experience more positive images of psychiatric issues than negative ones, proves that the media are an important vehicle in reduction of social distance toward the ill [6]. This in turn, may positively influence the curing process and social adaptation of individuals [7].

Nevertheless, the media coverage is frequently selective, as only few mental illnesses, such as: schizophrenia, depression, suicidal ideation or addictions, manage to reach public awareness [7]. Furthermore, often they are portrayed in a very stereotypical, incomplete and exaggerated way, which reinforces the negative image of psychiatric patients as persons who are dangerous, violent and who threaten others [3, 4, 8–10]. Such an image is further reinforced by popular culture and cinematography in particular [11, 12]. This situation gets even more complicated by the fact that the media often use psychiatric nomenclature inaccurately. Such terms as “mental illness” or “schizophrenia” are frequently used metaphorically to denote socially undesirable phenomena and behaviors, which strengthens the negative social image of psychiatric disturbances [13].

At the same time, it seems that social perception of psychiatric issues was heavily influenced by the completion of sequencing of the human genome in 2003. In fact, even before the Human Genome Project (HGP) was launched in 1990 there was a strong tendency to interpret many human behaviors and problems in terms of genetics what provoke claims over “the third wave of biological psychiatry” [14]. Thus, many researchers call for an analogous program in psychology which would enable to demonstrate how the genes and environment influence human behaviors [15]. Consequently, as genetics have become a dominant paradigm in medicine and psychiatry, not only disease but also many personality traits and behaviors are interpreted in genetic terms [16, 17].

For that reason, it should not be surprising that also behavioral genetics is becoming an object of vital interest for the media, which constantly inform the public about new discoveries of “the gene” responsible for a specific behavior [18–23]. It seems that the case of behavioral genetics in particular demonstrates how important the role of the media in informing and educating both the public and professionals is [2, 24–27]. The reason why it is so is that the interplay between genetics and behavior is very complex and abstract, which makes it difficult for the audience to understand it properly [28]. It stems especially from the fact, that genetic research, and especially behavioral genetic research is overly hyped [29–32]. On one hand, the media eagerly present science fiction dark future scenarios that reinforce the social fears over the consequences of human cloning, control of human behavior, crossing the frontiers of nature, designer

babies and new eugenics. On the other hand, the media fuel exaggerated expectations that in the (near) future the genes responsible for aggressive behaviors, addictions or anxiety will be identified and effective methods for their modification will be developed. What is problematic is that many readers do not possess the knowledge required to understand the complex interactions between genetics and behaviors [28]. Moreover, as the media often appeal to emotions, behavioral genetics is often framed either as a breakthrough or a controversy [29–35].

Although there is some research on the media coverage of behavioral genetics and genetics of mental illnesses [19–23, 36], still there are no such data on the Polish press.

Aim

This paper aims to examine how print news media frame the relations between genetics and human behavior and what images of behavioral genetics dominate in press discourse.

Methods

The research material includes 72 press articles on behavioral genetics published between 2000 and 2014 in four major Polish weekly magazines: “Polityka”, “Wprost”, “Newsweek Polska” and “Przekrój”. This type of press was chosen because, although television and the Internet are more popular than print news media, the latter seem to pay more attention to genetic issues than TV or radio. In contrast to daily press, including the so-called tabloids, weekly magazines are somehow more balanced in tone as journalists who write there have more time to prepare the news. As for the titles chosen for the study, the main criteria was whether they were published in the period I was interested in. Moreover, all these magazines are among the most read and influential magazines in the country and are characterized by a high level of journalism. What is also important is that they all have special science sections.

As most of weekly magazines in Poland do not possess electronic data base, all 2,930 issues were searched manually. Additionally, where it was possible, an electronic index was searched using the following key words: “behavior”, “personality”, “gen”, “genome”, “genetics”, “behavioral genetics”.

An initial analysis helped to identify 114 articles. In order to standardize the sample, articles on the genetics of mental illnesses, including depression, schizophrenia, bipolar disorder and attention deficit hyperactivity disorder were excluded from the study. Articles where the relations between genetics and behavior were barely mentioned were also excluded from the study. In the end, 72 articles where behavioral genetics was the main theme or was an important part of the article were included in the analysis.

The study material was subject to a content and frame analysis [37, 38]. In the first stage of the analysis all articles were read carefully which enabled to identify the most frequently used interpretative analytic frames that were subject to a quality analysis. The coding scheme was based on previous research [29, 31]. The main categories included in the coding frame were: publication date, theme, the role assigned to genes

(deterministic or nondeterministic), the overall tone of the article (optimistic, pessimistic, neutral/balanced), type of headline (sensationalistic or balanced), prediction about the future (possibility of behavioral modification), reference to social and implications of behavioral genetics. A grounded theory approach was the basis for the analysis [39].

The main question asked in this research referred to the type of frames used by the press to describe behavioral genetics. This, in turn, led to formulation of additional questions: 1. Do the media promote geneticization of human behavior? 2. Do the media reinforce a deterministic way of seeing human behavior; and 3. Is behavioral genetics portrayed in optimistic or pessimistic terms?

At the same time it is important to note, that as my aim was to present the way the print news magazines frame behavioral genetics I did not intend to evaluate the accuracy and reliability of the coverage.

Results

The structure of press coverage

While science stories, and those related to behavioral genetics in particular, constitute only a minor part of all articles published in the magazines included in the study, 72 such articles were identified. The highest percentage of such stories was published in “Newsweek Polska” (25, 34.7%), and the lowest in “Przekrój” (10, 13.9%). “Wprost” and “Polityka” had a similar number of publications: 19 (26.4%) and 18 (25%), respectively. Table 1 presents distribution of articles in the aforementioned magazines.

Table 1. **Distribution of articles in magazines**

Title of magazine	N	%
Newsweek Polska	25	34.7
Polityka	18	25.0
Przekrój	10	13.9
Wprost	19	26.4
Total	72	100.0

At the same time, there was an evolution in the frequency of the coverage (Figure 1). While the highest percentage of articles was published in 2001, when the draft sequence of the human genome was announced (11, 15.8%), its number remained relatively stable from the year 2003, when HGP was completed, until 2008, when the interest in behavioral genetics decreased, to peak again in 2014.

From all the analyzed press stories, 8 (11.1%) focused on behavioral genetics in general, and 6 (8.3%) on genetic foundations of personality. As for particular behaviors, most articles described aggression and violence (9, 12.5%). Other popular topics dealt with infidelity and love (7, 9.7%), political preferences (6, 8.3%), intelligence, homosexuality and sexual behaviors, morality and altruism (5, 6.9%), addictions, anxiety and susceptibility to stress, faith (4, 5.6%), propensity to risk and memory (2, 2.8%).

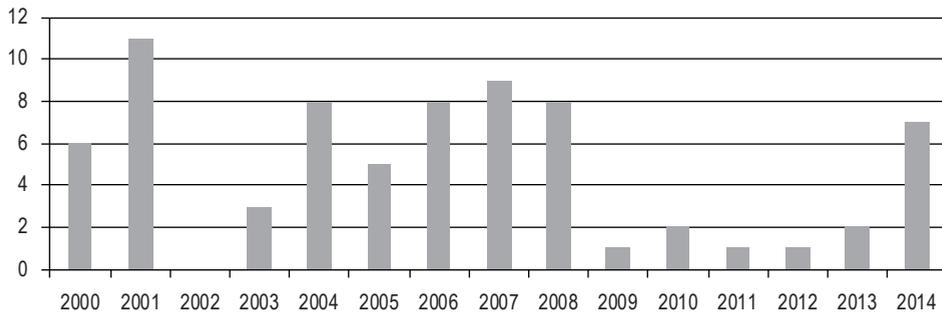


Figure 1. Number of articles per year (2000–2014)

Single articles described sleeplessness, laziness, communication and mathematic skills as well as entrepreneurship (1, 1.4%). Figure 2 presents themes of the articles.

In the majority of press articles behavioral genetics was the main theme (52, 72.2%), and many of these were overly sensationalized, as exemplified by the number of hyped headlines (48, 66.7%) (Table 2). Although almost one fourth of these (16, 22.2%) were balanced, the majority were overly sensational (32, 44.5%). Another example of “genohype” is that many articles framed the story as “discovery” or “breakthrough” (35, 48.6%). At the same time, many articles pointed to both what is already known about the genetic determinants of human behavior and what knowledge scientists are still missing (49, 68%).

Three-fourths of articles were neutral in tone (54, 75%). From the remaining articles, the majority framed behavioral genetics in terms of optimism (14, 19.5%),

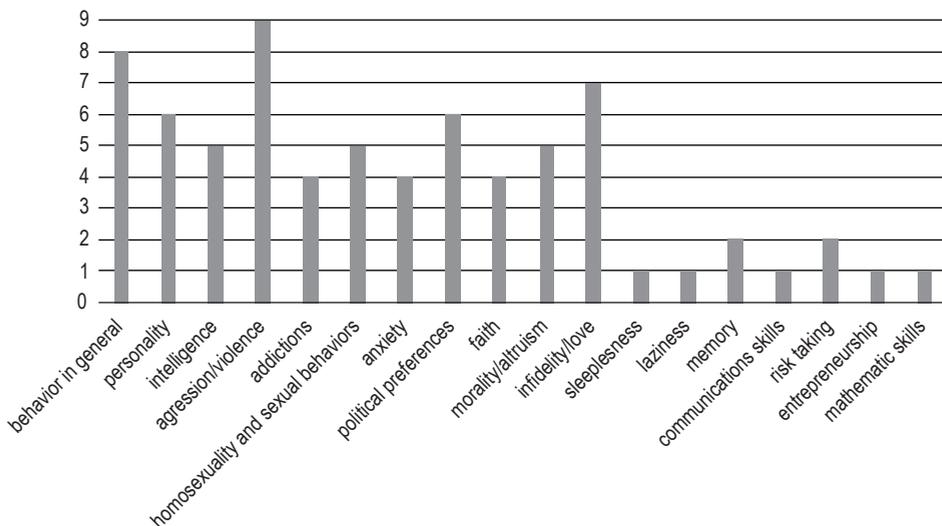


Figure 2. Main themes covered

while only 4 (5.5%) were pessimistic. One important dimension of optimism was a suggestion that in the near future it will be possible to make some genetic modifications to alleviate undesirable behavior, an expectation that was present in 11 stories (15.3%).

Almost one half of the articles (34, 47.2%) assigned genes with a deterministic role in shaping human behavior, and many of them did not mention the environmental or social determinants. At the same time, slightly more articles (35, 48.6%) stressed the probabilistic character of genetic conditioning, and while describing them as predispositions emphasized the importance of external factors. Significantly, only one third of all publications mentioned the social implications of the development of behavioral genetics (24, 33.3%)

Table 2. Questions on the coding frame related to the content of articles

	N	%
How genetics is covered		
Main theme	52	72.2
Secondary theme	20	27.8
Headline points to controversy		
Yes, imbalanced	32	44.5
Yes, balanced	16	22.2
No	24	33.3
Describes discovery as a breakthrough		
Yes	35	48.6
No	37	51.4
Description of current state of knowledge		
Refers to what is already known	23	32.0
Points to what is known and what is still unknown	49	68.0
Overall tone of article		
Optimistic	14	19.5
Pessimistic	4	5.5
Neutral	54	75.0
Prediction about the future		
Possibility of modification within 10 years	1	1.4
Possibility of modification without mentioning when	10	13.9
Does not mention	61	84.7
Role assigned to genes		
Deterministic	34	47.2
Probabilistic/nondeterministic	35	48.6
Does not mention	3	4.2

dalszy ciąg tabeli na następnej stronie

Mentions social implications		
Yes	24	33.3
No	48	66.7

The above systematic analysis of the data shows that whilst behavioral genetics, or science in general, does not belong to the hottest topics in the Polish general press, it, nevertheless, draws significant attention of these magazines. The magazines collected in the analyzed sample focus mainly on political, economic and social issues, but one finds also a great deal of publications devoted to various genetic issues. Over the last fifteen years, many genetic topics were covered more frequently than behavioral genetics. Suffice it to mention here clinical and oncological genetics, biotechnologies, genetic testing and genetically modified organisms.

Thus, the choice of the topics reflects the impact that the media exert on the public discourse on various genetic issues. By prioritizing some topics over others, the media present selected issues as important news and render them a matter of great public interest. While the media cannot compel individuals to think about genetic issues in a particular way, they can influence their social perception by framing them accordingly. This is due to the fact that the choice of such an interpretative frame results in a very particular selection of facts, events, arguments, experts and opinions, which further entails a very specific construction of the given phenomenon. This, in turn, makes it possible for the media to steer the readers' attention to the selected aspects of the phenomenon in question and creates for them an appropriate context of interpretation [37, 38].

Thus, in the second part of this paper, I will describe the major interpretative frames that were employed in Polish news magazines to describe behavioral genetics.

Main analytic frames of behavioral genetics in Polish news magazines

Essentialist frame

One of the most frequent frames used to portray behavioral genetics was the one that conceptualizes it in terms of essence, when it was stressed that the genes constitute the key for knowing and understanding human nature, identity and behavior [40]. Thus, according to this frame the human being is just a set of genes. It also suggests that there exists a unique genetic combination which determines humanness and individuality. Such an idea was expressed in "Polityka" which interviewed Professor Włodzimierz Oniszczenko, who said:

We should try to reach the origins of our behaviors, go down to the level of genes, as almost everything constitutes their derivatives
(Rotkiewicz M. *Co mamy w genach*. Polityka 2009; 10(2695): 24–26).

And in an issue of "Newsweek Polska" one can read:

(...) such noble feelings as gratitude, ability to form friendship and empathy, have been written down in [our – JD] DNA (Kastory B. Rodzinne związki. Newsweek Polska 2005; 18: 68–72).

The human genome is perceived here as a material marker of life and a definitive basis of humanity. Moreover, like the Christian soul, it becomes an ontological basis of identity, which is frequently reduced to molecular structure [18]. Such perception of genetic issues is best exemplified by the news headlines where genes are referred to as “the essence of mind” (Rotkiewicz M. *Esencja umysłu*. Polityka 2003; 7(2388): 72–73), and the genome is “biochemical soul” (Czajkowska-Majewska D. *Dusza biochemiczna*. Polityka 2001; 17(2295): 76–77):

(...) we are, from the point of view of evolution, only a packaging for genes (Słomczyńska-Pierzchalska M. W głębi siebie. Polityka 2001; 8(2286): 73–74).

Thus, typically of this frame, genetic reductionism propagates the idea that genes contain a complete instruction of the construction of human organism and it is genes that “create a human”, determining one’s uniqueness:

It is [the genome – JD] a kind of “black box”, as all the information regarding a person is written here (...) [It is a] Unique code of his existence (Woźniak O. Ludzka czarna skrzynka. Newsweek Polska 2001; 4: 77).

All in all, the essentialist frame is based on the assumptions of genetic reductionism, determinism and fatalism and reinforces the idea that one’s identity and individuality are not determined by his or her personal experiences, activity or dreams, but is hidden in a sequence of DNA unique for each person [40].

Materialistic frame

A similar way of framing genetic issues is the one that approaches it in strict materialistic and descriptive terms, where genes are described as physical objects and a vehicle of genetic information which can be known, read, edited and silenced:

While comparing copied segments of DNA, [scientists – JD] have chosen five “inactive” genes. It turned out that a mutation in just two of them causes a decrease in tolerance for alcohol. Switching of these two genes (...) reduces the risk of alcohol addiction (Baranowska A. Kieliszek dopaminy. Wprost 2001; 46(990): 90).

At the same time, while defining genes as peculiar “switching devices”, the materialistic frame perceives them as a basic unit of evolutionary selection and inheritance:

(...) most of our social behaviors – such as altruism, an ability to cooperate, a sense of justice, but also an inclination to fight for the best place in the group – we receive as a legacy from our animal

ancestors. These feelings, passed to us in the genes, were written through millions of years of evolution (Kastory B. *Rodzinne związki*. *Newsweek Polska* 2005; 18: 68–72).

As in the essentialist frame, also here the genome, DNA and genes are described as if they all were independent from the body and environment. Moreover, as they are said to constitute the invariable and timeless core of the organism, they become reified objects. As a result, it is genes, and not human actions, that determine who we are and who we will become. Thus, by separating genes from “self” makes it possible to assign the former responsibility for all human actions and individual behaviors [41]. Consequently, also this frame often does not take into account the phenotypic determinants of behavior, which makes it similar to the deterministic frame.

Deterministic frame

The essentialist frame, characterized by genetic reductionism, is often accompanied by a related belief that almost all human behaviors, emotional states and personality traits can be explained through their reference to specific genetic determinants. Consequently, almost half of news stories from the sample (34, 47.2%) described genes in a deterministic fashion, as genes were said to “be responsible for”, “cause”, “control” or “regulate” human behavior:

Doctor Rankinen is currently searching for the genes which make us sportspersons or couch potatoes (Kowalczyk A. *Gen kanapowca*. *Przekrój* 2007; 4(3214): 46–47).

We have written propensity to risk in our genes. They order us to jump with a parachute or climb the eight-thousanders (...) Propensity to risk, like excessive caution, turned out to be dependent on the number of copies of some sequence of DNA in a particular gene D4DR (Kastory B. *Gen ryzyka*. *Newsweek Polska* 2006; 23: 82–84)

Seeing genes as independent agents which steer human behavior reinforces the dominance of the so-called OGD model of explanation (one gene-one disease) [19, 21], according to which even the most complex behaviors and traits, like religious faith, love or aggression can be reduced to particular genetic determinants. It can be best exemplified by reference to specific genes in the headlines, including the gene of: risk (Kastory B. *Gen ryzyka*. *Newsweek Polska* 2006; 23: 82–84), politics (Burda K. *Gen polityki*. *Newsweek Polska* 2008; 44: 68–70), infidelity (Pietkiewicz B. *Geny niewierności*. *Polityka* 2001; 7(2285): 3–9, MF. *Geny niewierności*. *Wprost* 2004; 26(1126): 73), genius (Romanowska D. *Geny geniuszu*. *Wprost* 2000; 35(926): 79), aggression (Woźniak O. *Oskarżony mózg*. *Przekrój* 2010; 1(3367): 38–42), pleasure (Rubin J. *Geny przyjemności*. *Wprost* 2000; 38(929): 90–91). Other typical formulations include “the code of faith” and “the God gene” (Stradowski J. *Kod wiary*. *Wprost* 2004; 50(1150): 80–82) or “the DNA of a manager” (*Newsweek Polska* 2006; 24: 79). And although in the case of headlines such coverage is a type of marketing strategy to attract readers’ attention, this “gene talk” [42] pervades the entire press discourse.

For example, a prestigious journalist, Jacek Żakowski, while interviewing a professor of psychology, Jonathan Haidt, in “Polityka” asks him explicitly: “Are there the right wing and the left wing genes?”, and then writes about “people with right wing genes” without using a quotation mark (Żakowski J. *Gen wyborczy*. Polityka 2014; 47(2985): 37–39). In a similar fashion, in the article entitled “The genes of politics” published in 2008, “Newsweek Polska” writes about “born republicans and democrats” indicating that it is: “genes that decide about our behavior at the ballot box” (Burda K. *Geny polityki*. Newsweek Polska 2008; 44: 68–70). At the same time, the press frequently makes reference to a particular gene that determines the described behavior:

Scientists have discovered the code of faith in our DNA (...) It is the God gene responsible for spiritual experiences (...) in short marked as VMAT2 (Kastory B. Genetyk poszukuje Boga. Newsweek Polska 2005; 7: 62–66).

(...) all persons from that group were carriers of a specific variation of the gene marked FKBP5. It is responsible for the way the organism reacts to an increase in the stress hormone (Chyłkiewicz J. Skok adrenaliny. Newsweek Polska 2008; 17: 70–74).

What is significant is that, even when the press stresses the polygenetic determinants of human behavior, still it often points to a specific gene as its source:

What decides about their [people’s – JD], so different, attitude toward infidelity? – The gene V1aR – responds shortly Prof. Young (...) Also another gene – marked DRD4 – is responsible for our inclination to adultery (Romanowska D, Chyłkiewicz J. Niewierność zapisana w genach. Newsweek Polska 2013; 18: 80–83).

Not uncommonly, the journalists explicitly negate the environmental determinants, as for example, in one article on mathematic skills, published in “Wprost”, its author wrote:

Mathematical sense is inborn and does not depend on language or culture (MF. Liczenie w genach. Wprost 2008; 2(1307): 75).

In the same vein “Newsweek Polska” writes about morality:

(...) our basic moral impulses, such as mutual altruism, are coded in the genes, and are not imposed by culture (Kastory B. Na dwoje małpa wróżyła. Newsweek 2007; 9: 54–57).

On the other hand, while writing about genetic discovery authors of many publications simply do not mention the extragenetic determinants of human behaviors which may leave the impression that the described behavior is determined by genes alone.

Probabilistic frame

With the progress of science and the development of genetic knowledge describing behavioral genetics in a more relativistic way becomes more frequent. Consequently, the probabilistic frame, which frequently explicitly rejects the simplistic interpretation of human behavior typical of the essentialist and the deterministic frames, becomes more prevalent:

It is obvious nonsense, as there is no single gene responsible for intelligence (Nowakowska E. *Skąd ten temperament*. Polityka 2001; 6(2284): 72–74).

A single gene for alcoholism – the perpetrator of all evil – does not exist. Probably there are many genes employed in alcoholic disease, and the impact of single genes is scant (Rubin J. *Geny przyjemności*. Wprost 2000; 38(929): 90–91).

Thus, by stressing the significance of genetic factors in shaping human behavior this frame emphasizes the interplay between the genes and the environment. While describing the etiology, almost one half of press article framed it in terms of “genetic predispositions”, “susceptibility” or “risk” thus treating it more as a probability than as a determined fact:

Is the owner of the ill-fated genes doomed to addiction? No. It only increases the risk of addiction (Mikołuszko W. *Narkomania jak cukrzyca*. Polityka 2011; 51(2838): 71–73).

By stressing that genes only predict the probability of certain behaviors, the press often points to the environment that “triggers” the genes:

In 40–50 percent biology predisposes us to exhibit particular ideas. This does not mean that we are programmed to vote for a conservative or a left-liberal party – says Prof. Hibbing. Genes cause that we have some predispositions that result from our personality traits and moral rules, to perceive certain situations in a particular way. But the environment in which we live, the culture that surrounds us, the religion, the ideology play a huge role (Postoła A. *Mózg polityczny*. Wprost 2008; 12(1317): 74–77).

Thus, while the press admits that the role of the gene is undeniable, it often emphasizes that their influence is uncertain and indecisive. And by showing the importance of other factors, including the external environment, family patterns and personal experiences, the press tries to demonstrate the complexity of human nature, personality and behavior:

“For sure, not only genes determine infidelity, and definitely not a single gene” – admits Prof. Spector (...) much depends also on our surroundings, and especially on the patterns of behaviors of other persons in the family (MF. *Geny niewierności*. Wprost 2004; 26(1126): 73).

(...) in shaping human character and attitudes, personal experience that is not shared with anyone plays a decisive role (Wilk E, Growiec K. Ile mogą dać rodzice. Polityka 2014; 7(2945): 24–27).

At the same time, it is important to note that while emphasis on the extragenetic determinants of human behavior makes this frame more objective, i.e., scientific, in reality the line between it and the deterministic frame is often blurred and difficult to spot. Especially, laypersons may have problems with distinguishing genes related to alcoholism or aggression from the gene for alcoholism or aggression. Thus, in the studied sample, both frames were often equated with each other. Even when articles stressed the environmental factors, the overall tone of the paper was frequently deterministic. For example, although in one issue “Newsweek Polska” declared that it is not possible to isolate one or two simple genes responsible for our worldview and political preferences, at the same time it stated that genes are responsible for our political choices and “influence our eagerness to go to the ballot box”:

(...) our view of the world is not just a matter of will and individual decisions. Politics is also shaped by the factors we are not aware of – genes and structure and physiology of the brain (...) Behavior is not an effect of cold calculation, but of neurohormones in the brain, as it is genes that through specific proteins constantly affect the functioning of the brain (...) political preferences result from personality traits, which, in turn, in their majority are genetically determined (...) political campaigns and colorful leaflets (...) may convince those who have a proper configuration of genes, which makes us support this and not that party (Burda K. Geny polityki. Newsweek Polska 2008; 44: 68–70).

“Wprost” in turn, while addressing the determinants of aggression states:

The impact of parents on their children is rather small and is limited mainly to passing the genes (...) and a predisposition to aggression is an inherited feature (Postoła A. Różga w genach. Wprost 2007; 10(1263): 74–77).

Optimistic frame

While the majority of press stories from the sample described behavioral genetics in a balanced and neutral way, often in strictly descriptive terms, from the remaining articles that pictured it in either positive or critical stance (18.25%), the optimistic frame dominated over the pessimistic one. Typical of the former was that all three basic ideas of “genetic optimism” described by Peter Conrad were also observed in this study: the belief that the gene responsible for the described behavior exists, the belief that it will be found, and the conviction that it will bring positive results [20].

Thus, while journalists were supporting the long-lasting idea about genetic determinants of human behavior, they eagerly reported scientific findings on discoveries of particular genes responsible for a given behavior or its genetic predisposition:

The first gene determining intelligence in humans was isolated three years ago (...) The gene was found on 6. Chromosome (Romanowska D. Geny geniuszu. Wprost 2000; 35(926): 79).

Such stories were frequently reported in terms of a breakthrough, as it was referred to as an “epochal discovery”, a “turning point” or “sensational news”:

The discovery of the researchers from Oxford is a turning point not only for the world of science, but mostly for millions of people around the world (Woźniak O. Mowa o genie. Newsweek Polska 2001; 10: 78–80).

Significantly, such faith in the existence of specific genes that determine particular behaviors was expressed not only by journalists but also by scientists, as, for example, Michał Skalski from the Clinic of Treating Sleep Disorders in an interview with “Przekrój” said:

My idée fixe is to find the human gene for insomnia. The gene determining sleep in the fruit fly has already been found, and there are many data that a human also has this gene (...) I will find the insomnia gene (Kossobudzki P. W poszukiwaniu genu bezsenności. Przekrój 2006; 37(3195): 50–51).

Even when scientists and journalists were aware that the discoveries reported in the press are neither definitive nor decisive, they supported the idea that even in such complex behaviors as political preferences or religious faith, genetic determinants will be confirmed sooner or later:

We do not know yet, which particular genes are responsible for political preferences, but geneticists claim that they will be able to point them in couple of years (Wojtasiński Z. Mania sukcesu. Wprost 2006; 51(1253): 108–111).

Scientists do not know the specific address yet, but they have already identified that ability to spiritual experiences are inscribed in the genes and neural circuits in the brain (Kastory B. Bóg mieszka w mózgu. Newsweek Polska 2007; 47: 80–83).

The third component of the optimistic frame is the prediction concerning the positive results that are expected in the (near) future. The belief that scientific discovery will benefit both individuals and society at large was often expressed by such phrases as: “hope”, “very soon”, “in a short time”:

The new therapy gives hope for relatively fast development of special gene therapy (Woźniak O. Mowa o genie. Newsweek Polska 2001; 10: 78–80).

11 press stories (15.3%) emphasized that the progress in genetic knowledge and the rapid development of new biotechnologies will enable the modification of behavior described in the article. Such modifications were expected both in the form of progress in pharmacogenomics and gene therapy:

A hope has emerged for people experiencing anxiety episodes, for those suffering from claustrophobia and obsessively shy. Possibly, such persons will soon be able to get rid of the fear due to a pill that will help to alleviate the mood (...) When it is identified which of them [genes – JD] provoke states of anxiety, it will be possible to start designing drugs that will suppress those genes or the proteins they produce (LP. Strach ukryty w genach. Przekrój 2001; 36(2933): 57). Gene therapy will enable to cure alcoholism (Baranowska A. Kieliszek dopaminy. Wprost 2001; 46(990): 90).

Another source of genetic hope was placed on genetic engineering, which, according to “Polityka”, could help in modification of aggressive behavior:

The social role of love and friendship, a remedy for violence, could be reinforced by genetic engineering (Sadowski W. Nasz gadzi mózg. Polityka 2004; 3(2435): 68–69).

According to some journalists, an alternative for all these therapies can be placed on predictive tests which would enable prevention of undesirable behaviors, e.g., alcoholism:

Soon it will be possible to detect potential alcoholics by examining their brain waves (Rubin J. Geny przyjemności. Wprost 2000; 38(929): 90–91).

Pessimistic frame

Although behavioral genetics was more often framed with optimism, it should not distract attention from the fact that there were cases when press stories framed it in a pessimistic, i.e., critical way and stressed the negative consequences of defining human behaviors in terms of genetic essentialism, reductionism and determinism. Moreover, while only 4 press stories (5.5%) framed behavioral genetics in an explicitly critical manner, in total, one third of articles (24, 33.3%) mentioned the ethical, social or legal aspects of such research.

One of the most expressed fears associated with the development of behavioral genetics was related to the shadow of eugenics, both positive, referred to as “designing babies” and stimulation of their genes, and negative. Thus, while many stressed the fascinating dimension of genetic research, it was sometimes called as a “potentially dangerous field”:

Eugenics would become pretty real, perhaps parents would be able to choose genes for their children and to stimulate them properly (Rotkiewicz M. Co mamy w genach. Polityka 2009; 10(2695): 24–26). Genetic determinants of the functioning of the human brain evoke the darkest memories of “negative eugenics”, which almost one hundred years ago led the US to adopt in the state of Indiana the first law of sterilization of “the criminals, the idiots, the rapists and the feeble-

minded” (Wojtasiński Z. *Mania sukcesu*. Wprost 2006; 51(1253): 108–111).

Such fears were accompanied by the dark visions of the future which evoked classical dystopias: Huxley’s “Brave New World” and Orwell’s “Nineteen Eighty-Four”. By doing so, journalists stressed that genetic knowledge and technologies enable total control over individuals who will be submitted to neurogenetics tests even before being born and, if needed, preventively isolated:

Will (...) scientist design tests, which with almost one hundred percent accuracy will separate from the population of new born babies those who will commit a crime in the future? Maybe some kind of tests will be performed even before birth, just as currently prenatal diagnosis is done? (Stawiszyński T. *Zagadka mózgu mordercy*. Newsweek Polska 2012; 4: 72–75).

Another reason why genetics was criticized was that geneticization of behaviors was expected to justify all kind of deviant and antisocial behaviors and remove the blame and responsibility for one’s actions:

Even if you are rotten to the core you will be absolved, as scientists will put all the blame on the genes (Appleyard B. *Grzech – dobra rzecz*. Przekrój 2004; 19(3072): 28–32).

Research of geneticists and neurobiologists has already been used to justify brutal murderers (Romanowska D. *Urodzeni mordercy*. Newsweek Polska 2014; 40: 84–86).

Finally, some authors have pointed also to more philosophical consequences of dominance of the genetic paradigm, and especially the influence it may have on human’s self-consciousness:

(...) how will we live with the awareness that all our decisions and choices are, essentially, determined by the construction of our brains and the shape of our DNA? (Stawiszyński T. *Zagadka mózgu mordercy*. Newsweek Polska 2012; 4: 72–75).

Discussion and conclusions

This study shows how difficult task face journalists who try to pass to society the latest news on behavioral genetics. The complex and abstract character of genetic knowledge makes it hard for them to describe the sophisticated interactions between behavior, genes and the environment. Consequently, they use a set of interpretative frames which enable to highlight some aspects of the phenomenon: essentialist, materialistic, deterministic, probabilistic, optimistic and pessimistic. Nevertheless, although these frames are often used in combinations, science reporters still have to make some simplifications, which may result in people’s mistaken approach to the interplay between genetics and behavior.

The identification of these frames has also helped to answer the question raised in the study. At first, it showed that as the press reinforces the particular way of thinking about human behaviors in terms of genetic essentialism, reductionism and determinism, it is a significant vehicle of a broader process of geneticization [20, 21, 28, 40, 43]. It is exemplified by a significant number of behaviors which were attributed genetic origins, as in 72 press articles included in the sample 21 different behaviours were described. Taking into consideration, the profile of the analyzed magazines, which focus on social, political and economic topics, such numbers seem to be rather high.

This tendency is further confirmed by the fact that many press stories focus their attention solely on the internal (genetic) determinants of behavior, and they lack any reference to the polygenetic, environmental or social determinants. Thus, while the percentage of articles that framed genetics in a deterministic and a probabilistic (non-deterministic) way was almost the same, it is hard not to agree with previous studies whose authors argue that the media reinforce the deterministic image of genetic science [18, 44, 45]. This is problematic as this “mirage of genes” [45] may cause the readers to extrapolate and generalize genetic causality to behaviors and features they did not read about in the press [28]. Especially that the probabilistic frame was frequently hard to distinguish from the deterministic one. Moreover, inadequate interpretation of media coverage may, in some cases, have serious social consequences, as, for example, it may reinforce the stereotypical perception of entire social groups and communities through genetic factors [46].

At the same time, it seems that commonness of deterministic framing may result from the fact that science journalists are under constant pressure to publish. They may also be limited by time and space they have for their stories. As a result, they may overly simplify such complex and multifactorial phenomena as human behaviors, which are often described only through genetic perspective. Such strategy not only helps them to explain sophisticated genetic processes to laypersons, but also attracts readers’ attention [36]. After all, as some researchers suggest, the more complex the scientific results are, the more simplified they become and the more often they are framed in a deterministic fashion [28].

Simultaneously, it should be stressed that a slight majority of articles described the interactions between genetics and behaviors through a probabilistic frame, emphasizing their polygenetic and epigenetic determinants. Such results confirm the findings from other studies suggesting that the trend to portray genetics in a deterministic way becomes reversed and is more focused on physical features and diseases than on behavioral disorders [28, 47, 48].

As for the tone of media coverage, in contrast to my own expectations and other studies, the majority of articles were written in a neutral and balanced tone, as journalists tried to avoid both hyping genetic stories and exaggerated pessimism. Nevertheless, while many genetic discoveries were covered with some dose of reserve, if not skepticism, there was a tendency to favor those stories that confirmed the scientific findings about the existence of the genetic determinants of human behavior than those that did not [22, 23, 49]. Moreover, there was an unbalanced ratio between genetic optimism and pessimism, as the benefits resulting from genetic discovery were mentioned more

often than the potential risks and threats. In fact, the latter were barely mentioned [20, 21, 33, 36].

As for the interpretation, a dominance of the optimistic frame may result from the belief in the explanatory power of modern science so typical of western culture, as many press articles drew up utopic visions that thanks to scientific progress, it will be possible to know and modify the genetic determinants of human behaviors [20, 21]. Such enthusiasm was exemplified by the belief that – as in the case on mental illnesses – genetic discoveries will help to reduce social stigma of persons who violate social norms. Nevertheless, some studies show, that geneticization acts just in an opposite way and may reinforce social stigmatization, the reason being that, genetic essentialism, reductionism and determinism present in press discourse may reinforce the belief about permanence and irreversibility of behavior, thus undermining the belief in the possibility of its treatment [43]. Exaggerated genetic optimism may be also explained by the fact that in contrast to the many pessimistic news about politics, economy, military conflicts, criminality and social problems, including poverty, those referring to science are often portrayed as “good news” [20, 21, 33].

Yet, the finding that is worth mentioning is that some articles were skeptical of scientific reports, and, in particular, of the tendency of “finding and losing genes” [20], i.e., a premature announcement of genetic discoveries that cannot be confirmed by later studies. As one reporter wrote in an article on the genetics of alcoholism in “Wprost: “We should be cautious, as although the researchers have already heralded the discovery of ‘the schizophrenia gene’, ‘the sociability gene’ and even ‘the predisposition to watch television gene’, all of these announcements were scientific equivalents of a canard” (Rubin J. *Geny przyjemności*. Wprost 2000; 38(929): 90–91). Journalists’ skepticism was further exemplified by the emphasis some of them put on the complexity of the interplay between genes and the environment and discussing social, ethical and legal implications of the geneticization of behaviors. Especially, this last trend may suggest that the press is aware of the importance of ELSI’s, and thus may play an important role in the education of society about those issues. On the other hand, it should be stressed that the majority of the articles did not mention any of ELSI’s, which seems to contradict the above mentioned assumption. Moreover, taking under consideration the content and style of many publications, which are often presented in overly alarmistic and pessimistic tones, it is hard to deny that the aim of discussing social and ethical issues is only to attract readers’ attention.

All in all, it seems that apart from the significance of the finding on behavioral genetics, it is given too much interest by the press [20–23, 36]. The problem is that stirring too many expectations toward genetics and psychiatry or, on the contrary, fueling exaggerated fears, the media, and the press in particular, may lead to a decrease in public trust toward science when hopes and promises will not become real [21].

Finally, it should be emphasized that although Dorothy Nelkin is right, when she calls journalists “cheerleaders” who contribute to the creation of genotype and overly optimistic atmosphere around genetic research [1], the dominance of the deterministic and the optimistic framing may also result from a broader context related to the increasingly commercial character of modern science and the connection that

exist between scientists and biotechnological corporations. In fact, many researchers confirm journalists' dependence on the sources they get their information about science from. As scientists and research institutions are under pressure from the industry and government agencies which sponsor their research to make breakthrough discoveries that will benefit society, they may overly stress the positive results and hope for new therapies and underestimate or even omit the possible risks [21, 30, 32, 36]. Such a role of scientists in geneticization of behaviors and generating genohype is best exemplified by claims of many researchers quoted by the press about genetic basis of homosexuality, religious faith, infidelity or political preferences.

In conclusion, science journalists should be more critical toward their sources, and scientists themselves should avoid exaggerated claims and describe genetic discoveries in a more balanced manner. Equally important is to educate researchers how to communicate with the media effectively. It seems that these demands may improve the quality of media reporting on behavioral genetics, and benefit both science and society.

While, to the best of my knowledge, the present paper is the first to discuss the coverage of genetics-related news in Polish weekly magazines, some limitations need to be mentioned. First of all, the number of press articles included in the sample was not high. Consequently, the results should not be generalized. Thus, further research should be conducted that would include the other types of the media, like daily press, television and the internet, which are more popular and have greater impact on society than weekly magazines focused on political and social issues. Other limitations stem from the fact that this research does not tell how the public interprets media coverage. Meanwhile, readers are not passive recipients but they actively participate in a constant process of interpretation, negotiation, selection and attaching meaning to news taken from the media [24, 50]. Further limitations may also result from the qualitative methodology used in the study, as all content analysis is subjective, which may have influenced the interpretation of the research material. However, some advantages of this study should also be acknowledged. Most importantly, as there is a scarcity of previous work on the topic, this research sheds some light on the coverage of behavioral genetics-related news in Polish media.

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Supplementary material

An index of all press articles included in the sample and those cited in the main text are available upon the request from the author: jandomar@ump.edu.pl.

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