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Dimensionality of the Iowa-Netherlands Comparison Orientation Measure and
its relationship to Reinforcement Sensitivity Theory

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Abstract

The aims of this study were, first, to reassess the factor structure of the Iowa-Netherlands Social Comparison Orientation Measure (INCOM) and, second, to explore the associations of its factors with the Reinforcement Sensitivity Theory (RST) of personality. Data from 337 respondents were collected via online questionnaire. Structural equation models were used to assess the factor structure of the INCOM and test for relationships with RST traits. The results confirmed previous findings that the INCOM contains two factors: Ability, which relates to the comparison of performance, and Opinion, which relates to the comparison of thoughts and emotions. The two-factor model was found to be superior to the commonly used 1-factor solution. The models further revealed significant relationships with RST factors: positive associations between the Ability factor and the Behavioral Inhibition System (BIS) and Behavioural Approach System (BAS) Reward Reactivity; positive associations between the Opinion factor and BAS Reward Reactivity and Goal-Drive Persistence, and a negative association with BAS Impulsivity. These findings indicate that using the INCOM as a single scale is likely to miss significant unique relationships. Our findings also provide new insight into how individual differences in personality may influence social comparison behavior.

Keywords: social comparison, personality, reinforcement sensitivity theory

Introduction

Social comparison theory was first introduced in the 1950s (Festinger, 1954), and has since become a central concept in the social psychological literature (Buunk & Gibbons, 2007). The theory describes the process by which individuals compare themselves to others in order to self-assess their abilities and opinions (Festinger, 1954). While social comparison is broadly recognized as a basic attribute of human socialization (Gilbert, Price, & Allan, 1995), research indicates that the frequency of such comparisons vary from individual to individual – these individual differences are known as ‘comparison orientation’ (Gibbons & Buunk, 1999).

Differences in comparison orientation may be related to personality (Diener & Fujita, 1997), however, there is little research on this point. The present study is designed to fill this gap by investigating how individual differences in comparison orientation are related to the Reinforcement Sensitivity Theory (RST) of personality (Corr & Cooper, 2016). As a first step, we evaluated the factor structure of the Iowa-Netherlands Social Comparison Orientation Measure (INCOM) – a commonly used measure of comparison orientation. After confirming the factor structure of the INCOM, we explored how its factors relate to RST personality traits. Understanding if and how personality traits make an individual more prone to social comparison is important as frequent social comparison behavior has been negatively linked to subjective well-being (Steers, Wickham, & Acitelli, 2014; Tesser, Millar, & Moore, 2000; Thwaites & Dagnan, 2004; White, Langer, Yariv, & Welch, 2006).

The Iowa-Netherlands Comparison Orientation Measure

The INCOM was developed to measure individual differences in comparison orientation (Gibbons & Buunk, 1999). As Festinger’s original theory emphasized the comparison of abilities and opinions, Gibbons and Buunk focused on these two concepts. The INCOM has become a widely-used measure to test an individual’s propensity to collect information about others and/or compare that information to their own situation. Although the scale is often used

as a single measure, Gibbons and Buunk's (1999) validation of the scale confirmed that the 11-item scale comprises two subscales: Ability and Opinion. Items which load on Ability are concerned with performance (e.g., "how skilled am I compared to others?"), while items which load on Opinion pertain to the thoughts or opinions of others (e.g., "what should I think?" or "how should I feel?"). Gibbons and Buunk's analysis stated that a single factor scale was viable as, in their analysis, the two subscales were highly correlated; nevertheless, statistical fit was improved with a two-factor model. Jenny – elsewhere, you say '1-factor' but here 'two' – check for consistency of use throughout

This high correlation probably explains why the INCOM scale is frequently used as a single factor. While previous research has investigated how personality impacts global comparison orientation (Gibbons & Buunk, 1999; van der Zee, Buunk, & Sanderman, 1996), to our knowledge, no study has yet decomposed comparison orientation into its two factors and, then, compared their association with personality measures.

Individual differences and comparison orientation

Individuals with high social comparison orientation (SCO) have three common characteristics. As summarized by Gibbons and Buunk (2007, p. 14): "... those with high SCO are characterized by a combination of (a) a high accessibility and awareness of the self, (b) an interest in what others feel and think, and (c) some degree of negative affectivity and self-uncertainty."

Based on the Big-5 personality model, there is evidence that personality traits are associated with social comparison behavior (Gibbons & Buunk, 1999; van der Zee et al., 1996; van der Zee, Buunk, Sanderman, Botke, & Van Den Bergh, 1999) – as is well known, this model has five factors: Extraversion, Neuroticism, Conscientiousness, Openness to Experience, and Agreeableness (Costa & McCrae, 1992). There is a positive association between social comparison and Neuroticism, which represents an individual's propensity to experience

heightened states of psychological distress, and it is related specifically to fear, anxiety and depression. Individuals who score high in Neuroticism compare themselves to others frequently, tend to interpret comparisons negatively, and are prone to negative affect from such comparisons (Gibbons & Buunk, 1999; van der Zee et al., 1996; van der Zee et al., 1999). Additionally, evidence indicates that individuals scoring high in Extraversion – which reflects an individual's social tendencies and their inclination to experience positive emotions – show higher comparison orientation; although, it needs to be noted, these individuals interpret comparisons differently than those high in Neuroticism (Olson & Evans, 1999; van der Zee et al., 1999). The remaining Big-5 personality traits do not display consistent associations with comparison orientation (Gibbons & Buunk, 1999; van der Zee et al., 1996; van der Zee et al., 1999).

Most previous studies have used the INCOM measure as a unitary scale. Therefore, they cannot account for potential individual differences between the separate factors of Opinion and Ability of comparison orientation. Furthermore, although the Big-5 of personality is commonly used, it does not provide an explanation of the causal sources of these traits (Corr, DeYoung, & McNaughton, 2013). For this reason, it is possible that a different personality framework, such as the Reinforcement Sensitivity Theory (RST; Corr 2008) may shed new light onto the putative roles played by more basic aspects of personality in comparison orientation.

Reinforcement Sensitivity Theory

Reinforcement Sensitivity Theory (RST) is based on the biological and psychological processes which motivate behavior, and underlie emotion, motivation and learning (Corr, 2008). It assumes that individual differences in personality reflect variations in three systems: the *behavioral approach system* (BAS), responsible for positive-incentive and related to anticipatory pleasure; the *fight-flight-freeze system* (FFFS), responsible for the avoidance of, and escape from, immediate harm, and related to fear; and the *behavioral inhibition system*

(BIS), responsible for the detection of goal-conflict (e.g., FFFS-avoidance/escape and BAS-approach), and related to anxiety. As RST is rooted in evolutionary theory, these systems are primarily concerned with success and survival (Krupić, Gračanin, & Corr, 2016). Social comparison behavior, too, may have its roots in evolution, as it may have evolved to evaluate competitors and assess which traits increase the likelihood of social and reproductive success (Gilbert, Price, & Allan, 1995). The evolutionary roots of both theories may make RST more suitable to revealing potential relationships between personality traits and comparison orientation than the previous theories used in the literature.

Recent developments in RST research (Corr & Cooper, 2016) suggest a more nuanced relationship between its personality components and those of social comparison. This is especially true for the BAS, which is activated by social rewards, such as prestige and new friendships. While the BAS was originally conceptualized as a single dimension, studies have shown that the BAS is multi-faceted, prompting revisions of the RST (Carver & White, 1994; Smederevac, Mitrović, Čolović, & Nikolašević, 2014; see Corr, 2016 for an overview). While different variations of the revised RST exist (see Krupić, Corr, Ručević, Križanić, & Gračanin, 2016 for an overview), we chose to focus on the recent Reinforcement Sensitivity Theory Personality Questionnaire (RST-PQ) operationalization of the revised RST (Corr & Cooper, 2016).

The BAS has been re-conceptualized to reflect its multi-dimensional nature for the RST-PQ, splitting it into four sub-processes: Reward Interest, Reward Reactivity, Goal-Drive Persistence, and Impulsivity (Corr & Cooper, 2016). As people with high Reward Interest are motivated to seek out new relationships, they may be sensitive to comparing their opinions to those of others to form new relationships. Reward Reactivity is associated with the pleasure of receiving a reward or the excitement of victory; individuals who enjoy the rush of winning may be competitive and, therefore, more likely to compare their abilities. Goal-Drive Persistence is

associated with focus, restraint and goal-planning, and deals with the motivation to establish global goals and supporting sub-goals. As such, individuals high in Goal-Drive Persistence should be likely to compare both their abilities and opinions, as research has found that social comparison is sometimes used as a tool for self-improvement (Mumm & Mutlu, 2011; Taylor & Lobel, 1989). Impulsivity is associated with an individual's inclination to disinhibited, thoughtless and non-planned behaviors. These can be beneficial when caution and planning are no longer appropriate and the reward needs to be seized quickly, but it can impair adaptive behavior that requires planning and restraint. Accordingly, we do not expect to see an association between Impulsivity and comparison orientation.

The FFFS is activated by immediate threats, such as predators or rivals, and induces, depending on the environmental contingencies, active avoidance or escape behaviors, which are accompanied by the emotions of fear, dread, and panic (based on the severity of the threat). The purpose of the FFFS is to remove the individual from perceived danger; and, for this reason, it is most likely the least relevant RST factor for social comparison. However, it is possible that such a relationship exists, as previous research has found a positive relationship between FFFS and social anxiety (Kambouropoulos, Egan, O'Connor, & Staiger, 2014).

The BIS is activated when there is a conflict within or between systems (i.e., between any two equally strong, but opposing, goals). The BIS can be activated when a system is in conflict with itself (i.e., the FFFS needs to decide whether to fight or flee) or when two systems are in conflict with each other (i.e., the BAS is motivating an individual to speak to a potential mate, while the FFFS is motivating the individual to flee). It is responsible for risk assessment, passive avoidance, heightened arousal and contributes to anxious behavior (Corr, 2008; Corr et al., 2013). Although FFFS measures were traditionally included with the BIS in context of the original RST, research has demonstrated that they are separate constructs (Cooper, Perkins, & Corr, 2007). The BIS differs from the FFFS in that it is concerned with the future (although this

can be the immediate future), whereas the FFFS operates strictly in the present and is concerned with unambiguous immediate threat, here-and-now. As the BIS is associated with rumination and anxiety (Corr, 2008), it is likely that individuals who are high in BIS are likely to compare both their abilities and opinions frequently.

As social comparison behavior has been linked negatively to correlates of subjective well-being (Tessar et al., 2000; Thwaites & Dagnan, 2004; White et al., 2006), identifying if personality traits are associated with a propensity to frequent social comparison may aid in the understanding of how personality influences subjective well-being.

Dimensionality of the INCOM and its association with RST

The aims of this study were two-fold. First, to confirm the structure and dimensionality of the INCOM, and, second, to relate these dimensions to the RST of personality. Our hypotheses are as follows:

H1. Individuals higher in Reward Interest will be higher in INCOM Opinion.

H2. Individuals higher in Reward Reactivity will be higher in INCOM Ability.

H3. Individuals higher in Goal-Drive Persistence will be higher in both INCOM Opinion and Ability.

H4. Individuals higher in BIS will be higher in both INCOM Opinion and Ability.

Method

Participants and procedure

A sample of 337 participants (136 men, 201 women) was recruited online through Amazon Mechanical Turk (MTurk) and social media sites. Participants accessed the study online and gave informed consent. The age in the sample ranged from 18 to 70 years old (Table 1). The most common nationality was American (N = 304), followed by British (N = 15);

however, there were also participants from other countries ($N = 18$). Participants recruited through MTurk were paid \$2 for their participation, while those recruited through social media sites were compensated with a description of their personality profile. Data were analyzed with R statistical software (R Core Team, 2015) using the *lavaan* package (Rosseel, 2012).

Measures

Comparison orientation was assessed by the Iowa-Netherlands Social Comparison Measure (INCOM; Gibbons & Buunk, 1999). The 11-item measure assesses differences in comparison orientation. Responses range from (1) strongly disagree to (5) strongly agree for each item. A low score indicates that individuals are not prone to gathering information about others and/or applying such information to their own situations, and a high score indicates that individuals are prone to collecting information about others frequently, and/or regularly comparing that information to their own circumstances. As a single scale, the INCOM has excellent internal reliability (Cronbach's $\alpha = .90$).

Personality was assessed by the Reinforcement Sensitivity Theory Personality Questionnaire (RST-PQ; Corr & Cooper, 2016). The 65-item instrument measures the three major systems of RST: FFFS, BIS, and four BAS factors: Reward Interest, Reward Reactivity, Goal-Drive Persistence, and Impulsivity. Participants were asked how accurately each statement described them and responded on a scale from 1 (not at all) to 4 (highly). RST-PQ factors have adequate internal reliability (Table 1).

Control variables

We controlled for socio-demographic characteristics including age, gender and education. We also included a quadratic age term in our models to investigate if age has a curvilinear relationship with the outcome variables. Descriptive statistics for control variables are shown in Table 1.

Table 1

Descriptive statistics for respondent characteristics and personality traits

Variable	Mean	St. Dev.	Min	Max	Cronbach's α
Male	0.4	0.5	0	1	
University Education	0.6	0.5	0	1	
Age	36.5	11.3	18	70	
Reward Interest	17.1	4.6	7	28	.83
Reward Reactivity	26.5	5.5	11	40	.82
Impulsivity	16.6	4.6	8	29	.76
Goal-Drive Persistence	20.2	4.7	9	28	.88
BIS	52.9	16.1	24	88	.95
FFFS	23.7	6.9	10	40	.85

Note: University Education was coded as a binary variable with 0 denoting that the participant did not attend university and 1 denoting that the participant obtained at least a university education. Internal reliability was measured with Cronbach's alpha. Composite measures were computed by summing up all items with equal weighting for each item.

Analytical methods

We used structural equation modeling (SEM) to conduct our analysis. The maximum-likelihood method was applied as our data are normally distributed. We included three models in our analysis. The first model tested the fit of the commonly used 1-factor solution of the INCOM, while models 2 and 3 tested different two-factor solutions of the INCOM. We included two models with different two-factor solutions to confirm the structure of INCOM factors, as prior research has found different loadings for item 11 (“I *never* consider my situation in life relative to that of other people”). In Gibbons and Buunk's original research, item 11 loads onto the Ability factor in their first sample, and onto the Opinion factor in subsequent samples (Gibbons & Buunk, 1999). In recent research, item 11 also loads onto the Opinion factor (Schneider & Schupp, 2014). The question of which factor item 11 should load onto prompted our choice to include multiple models of the two-factor solution to find the best fit of the model to the data. Each model also includes a regression to explore how the factors of comparison orientation relate to RST, using the latent factors as dependent variables.

Results

Model 1: INCOM 1-factor solution

The SEM analysis was first conducted with the INCOM loading onto a single factor, which is the most commonly used configuration in the literature. The results revealed a poor model fit ($\chi^2 = 791.95$, $df(144)$, $p < .001$, $CFI = .74$, $RMSEA = .12$, $SRMR = .09$).

The SEM regression revealed significant associations between social comparison orientation and two RST traits: Reward Reactivity ($\beta = 0.24$, $p < .001$) and BIS ($\beta = 0.34$, $p < .001$). No other relationships with RST were significant. For a graphical representation of model 1, see figure 1.

Models 2 and 3: 2-factor solutions

The first two-factor solution we tested (model 2) was the original configuration suggested by Gibbons & Buunk (1999), with item 11 loaded onto the Opinion factor. The results revealed an acceptable fit, although the SRMR was slightly out of the acceptable range (below .05 indicates good fit): $\chi^2 = 352.46$, $df(133)$, $p < .001$, $CFI = .91$, $RMSEA = .07$, $SRMR = .06$. The second two-factor solution tested (model 3) loaded item 11 onto Ability instead of Opinion, as found by Schneider & Schupp (2014). The results revealed an improved model fit compared to model 2, with all of the fit indices indicating a good fit ($\chi^2 = 287.94$, $df(133)$, $p < .001$, $CFI = .94$, $RMSEA = .06$, $SRMR = .04$).

We, therefore, confirm that INCOM items load onto two factors, Ability and Opinion, and that a two-factor model should be used instead of the 1-factor model which had a poor fit. While both two-factor models displayed acceptable goodness-of-fit statistics, the fit of model 3 was somewhat better than the fit of model 2, therefore we conclude that item 11 should be loaded onto the Ability factor. The Ability and Opinion factors have adequate internal reliability (Cronbach's α : Ability = .92, Opinion = .86). Pearson's product-moment correlation reveals that the two factors are only moderately correlated, $r = 0.46$, $p < .001$, indicating that

most of their variance does not overlap. These latent factors have been allowed to correlate in our SEM analysis.

The SEM regressions from models 2 and 3 yielded similar results. While the standardized betas differed slightly, the same coefficients were significant in both regressions. Therefore, we report the results from model 3 (the superior model fit) below. For a graphical representation of model 3, see figure 2.

Ability

There was a significant positive association between the Ability factor and Reward Reactivity, $\beta = 0.20, p < .01$. We also found a significant positive association between the Ability factor and BIS, $\beta = 0.34, p < .001$.

Opinion

There was a significant positive association between the Opinion factor and Reward Reactivity, $\beta = .35, p < .001$. The results also revealed significant positive associations with Goal-Drive Persistence, $\beta = 0.13, p < .05$, and BIS, $\beta = 0.19, p < .01$, and a significant negative association between the Opinion factor and Impulsivity, $\beta = -0.16, p < .01$.

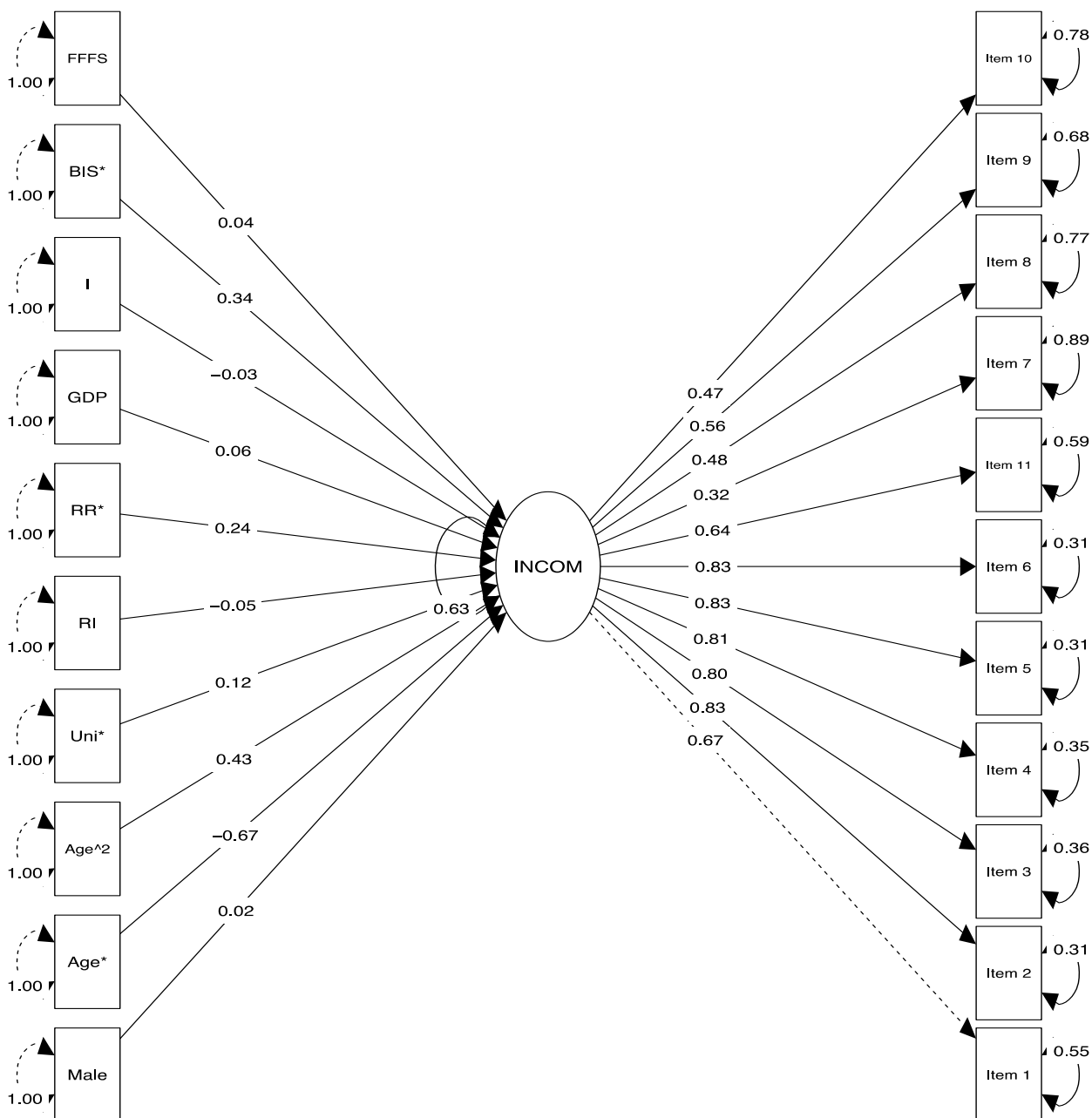


Figure 1. Standardized parameters of the SEM for model 1 with RST personality traits. Significant regression paths ($p < .05$) are denoted with *. Items 5 and 11 were reverse coded, as per INCOM instructions.

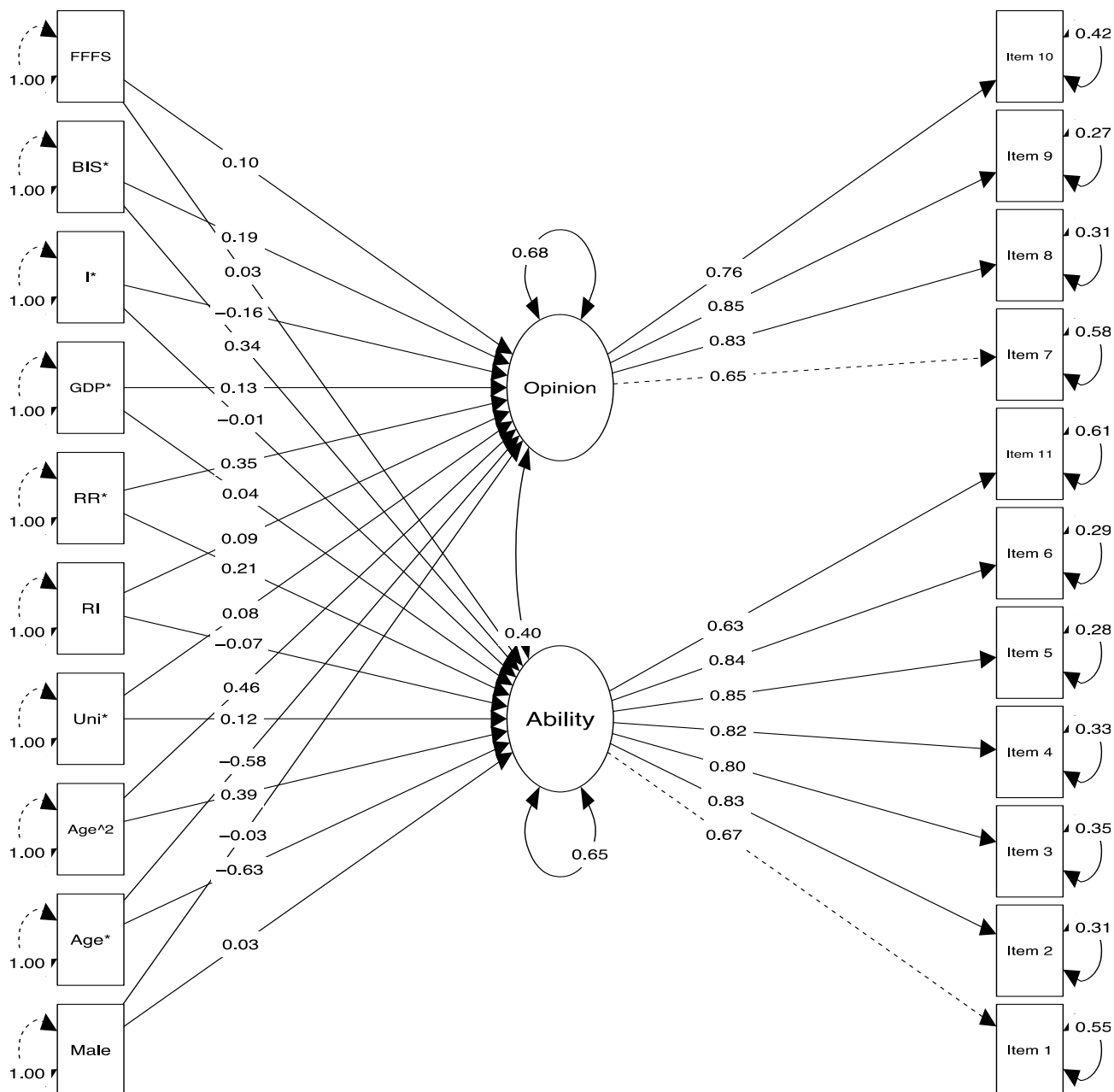


Figure 2. Standardized parameters of the SEM for model 3 with RST personality traits. Significant regression paths ($p < .05$) are denoted with *. Items 5 and 11 were reverse coded, as per INCOM instructions.

Discussion

The aim of the current study was to examine the factor structure of the INCOM, and to investigate how the INCOM subscales relate to the RST of personality. Our results confirmed that the INCOM is comprised of two subscales, Ability and Opinion, and we found that the two-factor model is a considerably better fit to the data than the commonly used one-factor model. We further investigated whether item 11 (“I *never* consider my situation in life relative to that of other people”) belonged to the Ability factor or the Opinion factor, as previous studies have found varying results (Gibbons & Buunk, 1999; Schneider & Schupp, 2014). Our results revealed that the model is a better fit to the data when this item is part of the Ability factor. Furthermore, our analysis revealed several relationships between personality traits and social comparison which, to our knowledge, have not been observed before. Previous studies investigating personality and social comparison have opted to use the INCOM as a single factor scale, as opposed to the two-factor approach suggested by Gibbons and Buunk (1999), which was also applied in this study. It is possible that the associations found in this study also exist between the factors of the INCOM and other personality scales, however, the use of the INCOM as a single factor may have led to these relationships being overlooked. Although the results from the Ability factor regression yielded similar results to the single factor INCOM scale regression, the Opinion factor regression revealed additional relationships with Goal-Drive Persistence and Impulsivity which were not observed in the single factor INCOM or the Ability factor regressions. This finding is important for future research interested in differences in comparison orientation, as it confirms that the INCOM scale is more sensitive when split into its two factors.

With respect to personality traits, our study revealed several significant relationships between the factors of the INCOM and the RST of personality. We found positive associations between both INCOM factors and Reward Reactivity as well as BIS in three SEM regression

models (Ability, Opinion and single-factor INCOM). Individuals who are high in Reward Reactivity are likely to be competitive, and therefore may compare their abilities to size up the competition. They may further use the comparison of opinions to gain social approval. This fits with prior research as some studies have found a link between Extraversion and social comparison behavior (van der Zee et al., 1999). Individuals high in BIS are likely to be anxious and prone to rumination, which may lead to the frequent comparison of both their abilities and opinions. It has been hypothesized that BIS is one of the underlying dimensions of FFM Neuroticism (McNaughton & Corr, 2004; Segarra, Poy, López, & Moltó, 2014), and this finding therefore corroborates past research which finds that individuals who are high in FFM Neuroticism are prone to frequent social comparison (Gibbons & Buunk, 1999; VanderZee et al., 1996).

Our study revealed two novel relationships between the Opinion factor and personality, namely Goal-Drive Persistence and Impulsivity. Individuals who are high in Goal-Drive Persistence may be rewarded by comparing opinions, as understanding how their viewpoints compare to those of others may allow them to use shared beliefs to gain trust and social affiliation. This theory is supported by recent research which found that the concept of Goal-Drive Persistence is related to the motivation for social exchange (Krupić, Gračanin, et al., 2016). The negative association between Impulsivity and Opinion suggests that individuals who are impulsive are less likely to compare their opinions. As Impulsivity is defined by acting quickly without planning it is possible that individuals high in Impulsivity are less concerned with the opinions of others. Additionally, as individuals who are high in Impulsivity are more interested in immediate rewards (Corr et al., 2013), it is possible that the social rewards available through the comparison of opinions are too time consuming to be appealing.

Limitations and conclusion

There may be a self-selection bias in our data, as respondents volunteered to participate.

Also, as the sample was largely from Western societies (USA/UK), we do not know if the results generalize to other cultures.

Additional research is needed to explore whether other relationships with social comparison have been overlooked in previous research by using the INCOM as a single scale. These include social media research, and studies investigating psychological health or depressive symptoms.

In conclusion, our study contributes to the ongoing debate about whether individual differences in personality impact social comparison behavior. Although the INCOM is frequently used as a unitary measure, our study indicates that a two-factor model provides a better fit and reveals associations between social comparison behavior and relevant covariates that may otherwise be overlooked. This approach allowed us to demonstrate the relationships between RST personality factors and comparison orientation, providing new insights into what type of individuals are more likely to engage in social comparison. This may help us to understand who is prone to frequent social comparison behavior, which is important as research has established links between frequent social comparison and negative correlates of subjective well-being (Feinstein et al., 2013; Steers et al., 2014; White et al., 2006).

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