Seclusion in adolescents with IGD: New diagnostic criteria or measure of severity?

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ABSTRACT

Introduction: Treatment demands for adolescents with problems derived from addictive video game use have increased significantly in recent years. In addition, many of these cases have concomitant social withdrawal or seclusion, which cause severe consequences in terms of global functioning. However, the authors could not find publications that study the relationship between IGD, seclusion and global functioning in adolescents in Western societies. The study aimed to investigate the association between these three constructs in an adolescent population.

Method: A sample of 135 outpatients (n = 118 males) with a mean age of 14.83 years (sd = 1.54), who consulted in the Addictive Behavior Unit of the Sant Joan de Déu Hospital in Barcelona (Spain), was assessed using the DSM-5 criteria for IGD, an ad hoc inventory on seclusion and the Children’s Global Assessment Scale (CGAS) to measure global functioning.

Results: Results showed significant associations between global functioning and IGD on the one hand and the presence of different aspects of seclusion on the other. Linear regression showed that IGD and seclusion, as well as their interaction, predict global functioning significantly.

Conclusion: These findings suggest that the presence of seclusion can be considered a measure of severity and that, when both conditions are given simultaneously, a different diagnostic conceptualization might be necessary and, consequently, a more intense and integrated therapeutic approach. However, more research is needed in order to contrast and expand these findings.

1. Introduction

Adolescents widely use video games, and there are clear psychological, social, and cognitive benefits to its use (Stavropoulos et al., 2018). For example, they improve hand-eye motor coordination and have a better performance in perceptual and attention tasks (Pontes, Kiraly, Demetrovics, & Griffiths, 2014); they are also better in starting and maintaining social relationships (Golder Carras, Van de Mheen, Van Rooij & Musci, 2017). Nevertheless, during the last few years, there has been an increase in the number of users who present addictive behavior, associated with videogame use (Muñoz-Miralles et al., 2016; Pontes, Kiraly, Demetrovics & Griffiths, 2014, Stavropoulos et al., 2018).

Studies in Spanish samples observe that 5.7% of adolescents have dependence (Mendez-Gago et al., 2018). Also, there is an increase in video game-related treatment demands in mental health services (Cerniglia et al., 2017; King & Delabbro, 2016; Matali et al., 2016; Torres-Rodriguez, Griffiths, Carbonell, & Oberst, 2018a, 2018b).

This phenomenon led to the inclusion of Internet Gaming Disorder (IGD) in the last version of the DSM-5, at section III, reserved for those disorders needing more evidence (American Psychiatric American Psychiatric Association (APA), 2013). Also, the World Health Organization (WHO) decided to include the Gaming Disorder in their last version of the ICD-11 beta draft (World Health Organization (WHO), 2018). However, the scientific community is still debating the existence or not
of such addiction (Ferguson, Bean, Nielsen, & Smyth, 2019; Pontes, 2018). There is a clear need for greater consistency and standardization, as the lack of it comes up with divided opinions (Aarseth et al., 2016). Some authors strongly defend the disorder (Griffiths, Kuss, Lopez-Fernandez, & Pontes, 2017) and have highlighted the importance of moving beyond this debate and focus on the fact that APA and WHO have already accepted it. However, more research is needed to understand the etiological and risk factors, clinical course, comorbidities, negative outcomes, prevention, treatment, and psychological motivations (Griffiths & Pontes, 2019; Pontes & Griffiths, 2019). The inclusion of IGD in diagnostic manuals and its acceptance in the scientific community also brings up another issue to be addressed, the lack of ethics of the video gaming industry and the urgent need of establishing prevention and control protocols inside the videogame (Griffiths & Pontes, 2019). Some countries like Korea have already implemented online gaming shutdown policy for adolescents younger than 16 years old (Ferguson et al., 2019; Tateno et al., 2019). Other countries also have shutdown policies, like Thailand, Vietnam, China and France (Ferguson et al., 2019). However, its effectiveness remains unclear.

Despite this controversial issue, IGD is a serious psychological problem that provokes and maintains personal and social dysfunction (Paulus, Ohmann, Gontard, & Popow, 2018; Torres-Rodríguez et al., 2018a, 2018b). Different studies have found a high prevalence of mental health disorders or comorbid psychological problems in those presenting IGD, such as depression (Elhai, Dvorak, Levine, & Hall, 2017; Huang, Liu, Su, Lin, & Ko, 2016), anxiety (Elhai et al., 2017), attention deficit and hyperactivity disorder (King & Delfabbro, 2016), insomnia (Chen & Gau, 2016; Li et al., 2017), stress, hostility, and isolation (Fumero, Marrero, Voltes, & Penate, 2018; Ostovar et al., 2016; Stavropoulos et al., 2017), self-injuries and suicidal behavior (Steinhübel et al., 2018). Moreover, in adolescent populations, there seems to be a relation between the intensity of videogame use and the presence of psychological problems (Giarrochi et al., 2016), such as poor school performance and troubled family relationships (Muñoz-Miralles et al., 2016).

The International Classification of Functioning, Disability and Health (ICF) identifies three levels of human functioning: functioning at the level of body or body part, the whole person, and the whole person in a social context. ICF defines basic interpersonal interaction as interacting with people in a contextually and socially appropriate manner, such as showing respect, warmth, appreciation, and tolerance in relationships. Complex interpersonal interactions refer to maintaining and managing interactions with other people by forming and terminating relationships; regulating behaviors within interactions; interacting according to social rules; and maintaining social space (World Health Organization, 2001). Related to IGD, it has been linked to a decrement in sleep hours (Griffiths, Davies, & Chappell, 2004), being more sedentary (Henchoz et al., 2016), worsening work or educational performance, and worse psychosomatic health (Witteke et al., 2015). Other associations include, an increase in stress (Snodgrass et al., 2014), greater psychopathological symptoms (Király, Nagygyörgy, Griffiths, & Demetrovics, 2014; Vukosavijevic-Gvozden, Filipovic, & Opacic, 2015), decision-making alteration (Yao et al., 2015), lower levels of sociability, self-efficiency and satisfaction with life (Festl, Scharkw, & Quandt, 2013), fewer leisure activities, less socialization and time with family, and the presence of social isolation (Yi & Wong, 2015; Stavropoulos et al., 2018).

T. Saito first described Hikikomori in 1998, and it can be translated as withdrawing and isolating oneself, characterized by people that so seclusion or social isolation (Li et al., 2017), worsening work or educational performance, and worse psychological problems (Ciarrochi et al., 2016), such as poor school performance or insufficient comprehension of the Spanish language. The final sample consisted of 135 participants, 85 of whom fulfilled criteria for IGD; 87.2% (n = 118) were male, and 12.8% (n = 17) were female, with a mean age of 14.83 years old (SD = 1.54); 48.1% (n = 65) of the adolescents played about 5–8 h a day during the week, and 25.9% (n = 35) around 2–5 h a day. During the weekend, 26.7% (n = 36) played more than 12 daily hours, 43% (n = 58) played between 8 and 12 h a day, and 20% (n = 27) between 5 and 8 h a day. 97.8% (n = 132) played during afternoons and the electronic device that was mostly used was the laptop (81.5%; n = 110).

2. Method

2.1. Participants

Participants were selected through consecutive sampling with adolescent users at the outpatient Addiction Unit of Psychology and Psychiatry Service of the Sant Joan de Déu Hospital of Barcelona, who consulted for addictive videogame use. To be included in the study, they had to be between 12 and 18 years old and not present cognitive problems or insufficient comprehension of the Spanish language. The final sample consisted of 135 participants, 85 of whom fulfilled criteria for IGD; 87.2% (n = 118) were male, and 12.8% (n = 17) were female, with a mean age of 14.83 years old (SD = 1.54); 48.1% (n = 65) of the adolescents played about 5–8 h a day during the week, and 25.9% (n = 35) around 2–5 h a day. During the weekend, 26.7% (n = 36) played more than 12 daily hours, 43% (n = 58) played between 8 and 12 h a day, and 20% (n = 27) between 5 and 8 h a day. 97.8% (n = 132) played during afternoons and the electronic device that was mostly used was the laptop (81.5%; n = 110).

2.2. Instruments

To assess the presence of IGD a clinical interview was conducted, by a clinical psychologist using the APA criteria (American Psychiatric Association (APA), 2013). In order to be diagnosed with IGD the examiner had to ascertain the presence of five or more of the following criteria during the last 12 months: (1) preoccupation with internet games; (2) withdrawal symptoms when internet games are taken away; (3) tolerance, resulting in an increase in the amount of time spent playing internet games; (4) unsuccessful attempts to control participation in internet games; (5) loss of interest in previous hobbies (other than...
internet gaming) as a result of internet games; (6) continued excessive use of internet games despite being aware of the resulting psychosocial problems; (7) deceiving family members, therapists and others with regard to the amount of internet gaming; (8) use of internet games to escape from or reduce negative moods; and (9) jeopardizing or losing a significant relationship, job or educational opportunity due to online gaming.

To evaluate the global functioning of the adolescents, the Children’s Global Assessment Scale (C-GAS) (Shaffer et al., 1983) was used by the clinician. The child or adolescent was given a single score between 1 and 100, based on a clinician’s assessment of a range of aspects related to the patient’s psychological and social functioning (school, family, social, judgment, reasoning, and affective state). The score will put them in one of ten categories that range from ‘extremely impaired’ (1–10) to ‘doing very well’ (91–100). For the present study, participants were distributed in three different groups according to their scores: Well-functioning (71–100); Difficulties (41–70); and Incapability (0–40).

To assess the presence of seclusion, an ad-hoc inventory was created based on the criteria for the Hikikomori (Saito & Angles, 2013). The clinician assesses presence, severity, and duration of seclusion in five different areas: academic seclusion (less than 50% of school attendance), afternoon seclusion (not leaving home during the afternoon), weekend seclusion (not leaving home during the weekend), family seclusion (avoidance of interaction with family members), school absenteeism (occasional absenteeism inferior to 50%), avoiding face-to-face interactions with peers, avoiding online interactions with peers, duration of seclusion (under one month, one to three months, more than three months).

The adolescent was considered secluded when they fulfilled at least two of the following criteria, during a minimum of two weeks: (i) The avoidance of face-to-face interaction, (ii) social isolation during afternoons (iii) social isolation during weekends.

2.3. Procedure

Data was collected by a mental health professional (clinical psychologist) in a clinical interview in the outpatient Addiction Unit of the Hospital. Prior informed consent was obtained from a parent or legal tutor in the case of underage participants (12–17 years) and from themselves if they were 18. Ethical clearance was obtained through the Hospital’s and the University’s Ethical Committees.

2.4. Data analyses

All analyses were conducted with SPSS version 26.0 (IBM Corp.) with a 5% of significant level. For data analysis, the following variables were considered: on a nominal level, these were presence (1) versus absence (0) of IGD, general seclusion, different aspects of seclusion (academic seclusion, afternoon seclusion, weekend seclusion, familial seclusion, school absenteeism, avoidance of face-to-face interactions, avoidance of online interactions); on an ordinal level, variables were time of seclusion (under one month, 1–3 months, over 3 months) and functioning categories (well-functioning, difficulties, incapability). The overall score of the C-GAS scale was also used; the distribution of the scale was non-normal with a mean of 42.50 and SD = 17.69, but as skewness and kurtosis fell into an acceptable range (0.492 and -.769, respectively), parametric statistics with bootstrapping procedure was used with the C-GAS. Descriptive results were calculated: number and percent of participants fulfilling IGD criteria and seclusion criteria, number and percent of participants falling into the different functioning categories. To assess if there is an association between functioning and the different aspects of seclusion, χ2 analyses were calculated between functioning category on one hand, and on the other, presence of IGD, of seclusion, as diagnosis as well as the different aspects of seclusion. To study the effects of IGD and seclusion and their interaction on the global functioning score, a regression model with bootstrap was estimated, with IGD and seclusion as the predictors and overall C-GAS score as outcome variable.

3. Results

3.1. Descriptive statistics and associations of variables

From a total of 135 participants, 63% (n = 85) fulfilled both IGD and seclusion in all contexts, except in school. Furthermore, almost half of the adolescents avoided face-to-face interactions (49.6%, n = 67) and had school absenteeism (44.4%; n = 60). Nevertheless, only 9 participants avoided online interactions also. At the time of the first visit in the Addiction Unit, 62.5% (n = 60) of participants had been secluded for three months or more, and 54.8% (n = 74) of the adolescents presented functional incapability.

Table 1 presents the frequencies of the categorical data and the results of the chi-square analysis: presence or not of IGD, presence or not of seclusion, presence or not of seclusion in the different areas, and their associations with the three functioning levels. As can be seen, none of the participants with IGD had adequate functioning, and all adolescents with incapability were secluded, as were 50% of those with functional difficulties. The association between functioning level and presence of IGD was significant, as were the associations between functioning level and all aspects of seclusion, except school absenteeism and the avoidance of online interactions.

3.2. Regression analysis

A significant regression model was found with F = 77.85 (p < .001) that explained 64% of the variance (adjusted R² = 0.638). Table 2 shows the parameter estimation of the regression analysis with global functioning score as the dependent variable with bootstrap and dummy coded predictor variables IGD and seclusion and their interaction. Seclusion had the most significant effect on global functioning (change in R² = 0.585) followed by IGD (R² change = 0.048); the interaction had an effect of R² = 0.010. The effect of the interaction was small but still significant. As can be seen in Table 2, the presence of IGD diagnosis predicts a decrease of −13.619 points in the mean C-GAS score, and the presence of seclusion predicts a decrease of −31.367 points. Since there was an interaction effect of the predictor variables, the effect of IGD on the C-GAS score among secluded adolescence is less than in adolescents who are not secluded, i.e. −13.617 + 8.013 = 5.604, though still significant.

4. Discussion

Treatment requests due to adolescents with Internet Gaming Disorder and with seclusion have increased during the last years (Kardfelt-Winther et al., 2017; Lee et al., 2013; Li & Wong, 2015; Heinzé & Thomas, 2014; Teo & Gaw, 2010; Stavropoulos et al., 2018). Many adolescents present both problems at the same time (Stavropoulos et al., 2018; Tateno et al., 2019), and there is a lack of knowledge in how these affect their functioning.

Our results are in line with previous studies that show that IGD negatively affects functioning in adolescents (Baer, Saran, & Green, 2012; Montag & Reuter, 2017; Paulus et al., 2018). Such findings, similar to those observed previously in psychiatric populations (Baer, Bogusz, & Green, 2011), suggest that functional deterioration is due to addictive use and not by gaming itself, even if it is the sole leisure activity. This confers greater weight onto the fact that videogame addiction is an independent entity associated with mental health issues such as global functioning (Baer et al., 2012). Therefore, when adolescents present criteria for IGD, special attention should be given to their general functioning in order to prevent or avoid further deterioration. Working on global functioning in the therapeutic context could, therefore, be a treatment strategy for IGD. Future studies are needed to validate this.
Dependent variable: C-GAS score.

Regression parameters.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>B</th>
<th>SE</th>
<th>p</th>
<th>Lower Bound</th>
<th>Upper Bound</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>69.182</td>
<td>2.602</td>
<td>&lt;.001</td>
<td>62.961</td>
<td>73.130</td>
</tr>
<tr>
<td>IGD</td>
<td>-13.619</td>
<td>2.955</td>
<td>&lt;.001</td>
<td>-18.650</td>
<td>-7.018</td>
</tr>
<tr>
<td>Seclusion</td>
<td>-31.367</td>
<td>3.324</td>
<td>&lt;.001</td>
<td>-37.519</td>
<td>-24.675</td>
</tr>
<tr>
<td>IGD*seclusion</td>
<td>8.013</td>
<td>3.797</td>
<td>.121</td>
<td>24.675</td>
<td>15.367</td>
</tr>
</tbody>
</table>

Table 1
Associations of functioning levels with IGD and seclusion.

<table>
<thead>
<tr>
<th>C-GAS</th>
<th>Well-functioning</th>
<th>Difficulties</th>
<th>Incapability</th>
<th>p</th>
<th>( \chi^2 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>IGD criteria</td>
<td>Yes</td>
<td>0.0% (n = 0)</td>
<td>78.9% (n = 30)</td>
<td>74.3% (n = 55)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>No</td>
<td>100.0% (n = 23)</td>
<td>21.3% (n = 8)</td>
<td>25.7% (n = 19)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seclusion</td>
<td>Yes</td>
<td>13.0% (n = 3)</td>
<td>50.0% (n = 19)</td>
<td>100.0% (n = 74)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>No</td>
<td>87.0% (n = 20)</td>
<td>50.0% (n = 19)</td>
<td>0.0% (n = 0)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Academic seclusion</td>
<td>Yes</td>
<td>21.7% (n = 5)</td>
<td>18.4% (n = 7)</td>
<td>40.5% (n = 30)</td>
<td>0.032</td>
</tr>
<tr>
<td>No</td>
<td>78.3% (n = 18)</td>
<td>81.6% (n = 31)</td>
<td>59.5% (n = 44)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Afternoons seclusion</td>
<td>Yes</td>
<td>34.8% (n = 8)</td>
<td>63.2% (n = 24)</td>
<td>87.8% (n = 65)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>No</td>
<td>65.2% (n = 15)</td>
<td>36.8% (n = 14)</td>
<td>12.2% (n = 9)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weekends seclusion</td>
<td>Yes</td>
<td>13.0% (n = 3)</td>
<td>50.0% (n = 19)</td>
<td>94.6% (n = 70)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>No</td>
<td>87.0% (n = 20)</td>
<td>50.0% (n = 19)</td>
<td>5.4% (n = 4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Familial seclusion</td>
<td>Yes</td>
<td>26.1% (n = 6)</td>
<td>57.9% (n = 22)</td>
<td>77.0% (n = 57)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>No</td>
<td>73.9% (n = 17)</td>
<td>42.1% (n = 16)</td>
<td>23.0% (n = 17)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>School absenteeism</td>
<td>Yes</td>
<td>47.8% (n = 11)</td>
<td>42.1% (n = 16)</td>
<td>44.6% (n = 33)</td>
<td>0.909</td>
</tr>
<tr>
<td>No</td>
<td>52.2% (n = 12)</td>
<td>57.9% (n = 22)</td>
<td>55.4% (n = 41)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Avoiding face-to-face interactions</td>
<td>Yes</td>
<td>17.4% (n = 4)</td>
<td>28.9% (n = 11)</td>
<td>70.3% (n = 52)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>No</td>
<td>82.6% (n = 19)</td>
<td>71.1% (n = 27)</td>
<td>29.7% (n = 22)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Avoiding online interactions</td>
<td>Yes</td>
<td>0.0% (n = 0)</td>
<td>2.6% (n = 1)</td>
<td>10.8% (n = 8)</td>
<td>0.966</td>
</tr>
<tr>
<td>No</td>
<td>100.0% (n = 23)</td>
<td>97.4% (n = 37)</td>
<td>89.2% (n = 66)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time of seclusion (n = 96)</td>
<td>&lt;1 month</td>
<td>0.0% (n = 0)</td>
<td>47.4% (n = 9)</td>
<td>2.7% (n = 2)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>No</td>
<td>33.3% (n = 3)</td>
<td>26.3% (n = 5)</td>
<td>25.6% (n = 19)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;3 months</td>
<td>66.6% (n = 2)</td>
<td>26.3% (n = 5)</td>
<td>71.6% (n = 53)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 2
Regression parameters.

In adolescents with seclusion, this factor also results in a decrement of the global functioning. Findings match other studies done in adults, which describe consequences in global functioning provoked by the hikikomori, mainly in Eastern societies (Kato et al., 2019; Li & Wong, 2015; Teo & Gaw, 2010; Yong & Nomura, 2019). In our sample, it was observed that the greater the seclusion (afternoons, weekends, familiar and academically), the worse the global functioning. It therefore, seems that seclusion is an aspect that has to be considered when assessing and treating adolescents.

The present study thus shows that both IGD and seclusion have significant detrimental effects on general functioning; however, the effect is probably not just synergistic. When the two occur together, the interaction shows a dampening effect. This effect is small, but it shows that the two conditions do not interact to strengthen each other, i.e., even if functioning is overall worse when both occur together, the combined effect is not as bad as if IGD and seclusion were independent. This may be important for understanding the development of the symptomatology and how to treat them, indicating the need for further studies focusing on the nature and the development of IGD and seclusion and its interaction. Also, the development of specific intervention protocols in order to treat each of these conditions, especially when they appear simultaneously.

It should be highlighted that in the study there was no significant correlation between school absenteeism and global functioning. A possible explanation is that in our context, there is a School Absenteeism Program, designed to detect this situation and to prevent its chronicity. Therefore, politics related to early detection in the educational system seem to be a good action strategy to prevent a worsening of schooled adolescents.

Many secluded adolescents with IGD tend to avoid face-to-face interaction, using online platforms as a way to establish and maintain interpersonal relationships (Kato et al., 2019; Tateno et al., 2019; Yong & Nomura, 2019). The relationship between online social interaction preferences and seclusion as well as Pathological Internet Use (PIU) was already found in early studies (Caplan, 2003; Davis, 2001). These studies found that Internet socializing is easier, more exciting, and not as risky as face-to-face because face-to-face interaction requires more skills (Caplan, 2003). These studies also found that cognitions about the self like "I am only good on the Internet" are related to PIU and seclusion, explaining a vicious cycle where people seclude themselves preferring online interactions. They suggest that seclusion and preferring online socialization are risk factor for developing PIU (Davis, 2001). More recent studies show that this allows them to fulfill their emotional and belonging needs (Sachikoho, 2015; Stavropoulos et al., 2017; Stip, Thiibault, Beauchamp-Chatel, & Kisel, 2016; Tateno et al., 2019; Uchida & Norasaki, 2015) and suggests the possibility that these adolescents have basic difficulties, and that through Internet-based applications they find a way to palliate them (Caplan, 2010; Tateno et al., 2019). Ultimately, this increases the risk of developing an addiction (Kardefelt-Winther et al., 2017; Kuss et al., 2017; Yong & Kaneko, 2016). A better understanding of the implications of face-to-face interactions and online interactions preferences is needed and which role it plays in seclusion and IGD. This would allow new prevention and treatment modalities for those adolescents that tend to avoid face-to-face relationships, are secluded and have developed IGD.

Our finding also suggests that the presence of seclusion is a possible clinical indicator of severity in adolescent populations. An explanation for it could be the fact that secluded adolescents present more comorbid psychological problems or mental health disorders related with anxiety, mood and interpersonal difficulties, not just with IGD (Chen & Gau, 2016; Elhai et al., 2017; Fumero et al., 2018; Kato et al., 2019; King & Delfabbro, 2016; Li et al., 2017; Ostovar et al., 2016; Stavropoulos et al., 2017; Steinbichler et al., 2018; Torres-Rodriguez et al., 2018; Warberg, Kriston, Zeiglmeier, Lincoln & Kammerle, 2018; Yong & Nomura, 2019). Thus, in a social context where the number of secluded adolescents constantly increases (González-Bueso et al., 2018), it is essential to elaborate treatment plans in order to respond to this new reality.

It is also important to consider associated social factors in seclusion like family, school and life expectations (Kato et al., 2019; Li & Wong, 2015). Those related to the family would be: nuclear family without extended support (Borovoy, 2008; Kaneko, 2006; Lee et al., 2013), broken family (Chong & Chan, 2012), death of a family member (Kondo et al., 2013), familial dynamics and increasing dysfunctionality in
children (Chan & Lo, 2014a; Heinez & Thomas, 2014), and overprotective and overdependent parenting styles (Kato et al., 2019). Academic factors that can affect seclusion are bullying and peer rejection (Borovoy, 2008; Chong & Chan, 2012; Kondo et al., 2013; Lee et al., 2013; Teo, 2010). Also, the fact that if students miss out on several classes, in a rigid and highly competitive educational system, where it might be difficult to catch up, they can end up experiencing a feeling of academic uselessness, and as a consequence, abandon school (Kato et al., 2019; Uchida, 2010). Another factor is the presence of high family and academic expectations, as well as the characteristics of specific contemporary societies. In Asia, secluded young people tend to be the eldest son (Asian, middle-class parents have a very high expectation of their firstborn son) (Furlong, 2008; Pozza et al., 2019; Teo, 2010), leading them to experience a self-confidence crisis when they fail (Lee et al., 2013). Moreover, in the past and in the so-called merit-based pay system (Furlong, 2008; Kato et al., 2019), hard-working people with secondary and university degrees usually would find good jobs that allowed them a full-time and life-long employment. Nowadays, with fewer traditional opportunities (Kato et al., 2019), academic success does not guarantee good professional and economic outcomes and may lead to what is called precariat, which is becoming a major social and economic problem in many countries (Suwa & Suzuki, 2013).

This study has several limitations. First of all, it is important to mention that there is no standard international conceptualization of seclusion just for adolescents. In our cultural context, six-month seclusion in adolescents is considered excessive. There are protection and alarm systems that identify these adolescents before they arrive to such period of time, especially if they are under 16 years old. Therefore, our clinical research group had to elaborate their own criteria, which might be different from the ones proposed by other professionals and researchers. Other authors outside Japan have also modified seclusion period and diagnostic criteria adapting it to their cultural context (Pozza et al., 2019). Therefore, there is a clear need of developing more research in the field. Our results cannot be generalized to the general population nor to females, as girls only represented 12.8% of the sample. This percentage, however, matches the clinical reality and the scientific literature that shows that IGD and seclusion are mainly a problem in males. Also, comorbid conditions were not taken into account. Literature has shown that there are comorbid psychiatric disorders in both IGD and seclusion; the presence of other disorders could also explain the decrease in global functioning. Future studies are needed, including comorbid disorders.

In conclusion, this study shows the relationship between IGD, seclusion and general functionality in adolescents. The presence of both IGD and seclusion is related to a worsening in the adolescents’ functioning. Seclusion showed to have a more substantial detrimental effect and is related to greater clinical severity. When both conditions are given together, there is a dampening effect of seclusion on IGD. Taken together, these results point out the importance of assessing seclusion in those adolescents with IGD and the need for developing specific interventions for this kind of cases.

Authors specific actions
Conceptualization: Josep Matalí, Elena Flores, Methodology: Josep Matalí, Ania Pérez-Racana, Ursula Oberst, Validation: Josep Matalí, Elena Flores, Formal analysis: Josep Matalí, Ania Pérez-Racana, Ursula Oberst, Elena Flores, Investigation: Josep Matalí, Ania Pérez-Racana, Ursula Oberst, Maria Lleras, Paola Bertomeu, Elena Flores, Data curation: Josep Matalí, Ania Pérez-Racana, Paola Bertomeu, Maria Lleras, Writing Original: Josep Matalí, Ania Pérez-Racana, Ursula Oberst, Maria Lleras, Paola Bertomeu, Elena Flores, Writing review: Josep Matalí, Ania Pérez-Racana, Ursula Oberst, Elena Flores. Supervision: Josep Matalí, Elena Flores, Project administration: Josep Matalí, Elena Flores

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