Article

Game-Based Socio-Emotional Skills Assessment: A Comparison Across Three Cultures

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Abstract

Hall of Heroes, a digital game, was used to compare social and emotional skills of 63 adolescent female students matched for age across Malaysia, South Africa, and the United States. Participants were assessed on six social and emotional competencies during game play, namely impulse control, cooperation, communication, social initiation, empathy, and emotional regulation and assigned to high, average, and low categories. Chi-square and odds ratio analyses revealed novel, significant correlations between various social and emotional skills for all cultures, suggesting similarities in socio-emotional development. In view of the increasing cross-cultural compositions of classrooms, these results may be beneficial to educators and school administrators.

Keywords

games, socio-emotional learning, adolescents, cross-cultural, technology-based assessment

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Introduction

Social and emotional learning (SEL) can be described as the process of integrating thought, feeling, and behavior in order to become aware of the self and of others, to make responsible decisions, and to manage one's own behaviors and those of others (Zins & Elias, 2007). A meta-analysis of research programs focused on SEL has shown that schools that include a systematic process to foster students' social and emotional (SE) development report not only an increase in academic performance but also better relationships between students and teachers and a decrease in problem behavior (Collaborative for Academic Social and Emotional Learning, 2005; Darling-Churchill & Lippman, 2016; Durlak, Weissberg, Dymnicki, Taylor, & Schellinger, 2011; Webster-Stratton & Reid, 2004). Studies have also highlighted that students with strong SE skills that include cooperation, empathy and emotion regulation, exhibit prosocial behavior in that they participate actively in classrooms, demonstrate positive attitudes, and feel more connected and safe at school (Durlak, Domitrovich, Weissberg, & Gullotta, 2011; Schutte, Malouff, & Bobik, 2001), while the absence of SE in schools can contribute to classroom management problems, school dropout, bullying, poor academic performance, emotional difficulties, and problems with interpersonal relationships. In fact, it is now widely accepted that schools must be equipped to not only meet but also intervene with and develop SE developmental needs of students for effective teaching and learning to take place and for students to reach their full potential (Taylor, Oberle, Durlak, & Weissberg, 2017).

During early childhood, SE skills are organized around positive engagement with people and the environment, managing emotions within social interactions, and remaining connected with adults while also adjusting well with peers. As children approach adolescence in middle school, students need to navigate through a wider social network and emotional regulation gains importance as they are expected to form closer relationships, adjust within a larger peer group, develop the ability to consider multiple perspectives, and gain emotional independence (Denham, 2016). Considering the need for social integration and self-assertion, SE skills assume new important roles during adolescence (Klimstra, Hale, Raaijmakers, Branje, & Meeus, 2010).

Indeed, social behaviors are not objective, isolated actions that can be assessed independently of the context in which they occur. Accordingly, studies suggest that SEL occurs within a cultural context (Sharma & Fischer, 1998), though there is no definitive evidence that culture defines SEL, or that SE skills are universal across the cultures. For example, within individualistic cultures, independence is valued above interdependence. This is in contrast to collectivist cultures, where the primary value is that of collectivism and behaviors that advance the group are valued more (Durlak, Domitrovich, et al., 2011). Along similar lines, key competencies such as self-awareness and

self-management are given more importance in individualistic cultures, while social awareness and relationship skills are more valued in collectivist cultures. In individualistic societies where the *individual* is considered the focus, more attention is given to recognizing and understanding one's own thoughts, behavior, and emotions, while in collectivist cultures, competencies such as empathy, collaboration, and perspective taking are valued more. There is growing evidence to suggest that emotions such as *praise, shame, empathy, dependency, love, and hate* are culturally determined and their development depends on social and cultural backgrounds (Sharma & Fischer, 1998). There is thus sufficient evidence available to suggest that cultural variations influence how various SE competencies develop.

Given that schools today are increasingly multicultural and multilingual with students from diverse social and economic backgrounds, it is important to undertake research to understand how culture influences SE skills. The primary objective of this study was to compare SE skills in children across three different cultures. The students who participated in the study belonged to Malaysia, South Africa, and the United States of America. They were part of a larger research study on *Digital Intercultural Exchange* focused on exploring digital dialogue as a tool to improve intercultural understanding among adolescent children.

To conduct a comparative study of SE skills across cultures, it was crucial to use a common method of assessment. Traditionally, behavior rating scales, observations, child interviews, or peer nominations have been used to asses SE skills (DeRosier, 2014). However, these methods of assessment are limited in many ways. Behavioral questionnaires and interviews are often completed by teachers stand the danger of personal bias and cultural specificity. Behavioral observation coding systems and child interview protocols require considerable staff time (e.g., training, administration, scoring, reporting) thus making them costly and time-consuming to implement. In addition to administration and implementation challenges, one of the most crucial factors that limit the utility of the resulting data is that of *stated* versus *revealed* preferences. Children are known to modify their behavior because they are being observed (Crowe, Beauchamp, Catroppa, & Anderson, 2011; Christ, Riley-Tillman, Chafouleas, & Jeffery, 2011; Matson & Wilkins, 2009) and might report behavior that is *expected (stated)* of them but not necessarily *demonstrate (revealed)* it. Consequently, manual assessment of children's SE skills remains a significant challenge.

Performance-based assessments have reemerged in education literature and curricula since they provide authentic and reliable measures of student learning and the ability to apply skills and knowledge learned in real-world like situations. In addition, such performance-based assessments can now be gamified because of technological advances. As more children are provided access to new technologies and exposure to digital games has increased, game-based SE skills assessments have emerged as effective solutions that transcend many of the

limitations of traditional assessment methods (Derosier, Craig, & Sanchez, 2012; DeRosier, 2014). Game-based SE skill assessments allow data collection that is time and cost-efficient. Digital games are also capable of tracking changes in student's behavior over time (Bellotti, Kapralos, Lee, Moreno-Ger, & Berta, 2013). Moreover, game-based SE skills assessments can incorporate *stealth assessment* that is assessment being done without the student realizing it, hence providing an opportunity to assess the behavior of the student when given a similar real-world situation (Rowe & Lester, 2010; Shute & Ke, 2012). Therefore, game-based SE skills assessments offer a far more engaging, affordable scalable alternative (Elias, 2015). Finally, for the purposes of this study, game-based assessments provide a common unbiased tool that can be used to compare SE skills in children across different cultures. In fact, there is prior evidence that such game-based assessment can detect social emotional cultural differences. An earlier study by Craig, DeRosier, and Watanabe (2015), the authors demonstrated culturally relevant differences in SE skills for children in Japan and the United States, using the game-based assessment tool Zoo U.

To compare cultural differences in SE skill development in adolescent children, we used a recently developed game entitled *Hall of Heroes* (DeRosier & Thomas, 2019). *Hall of Heroes* is a single player, point-and-click, engaging digital game designed to assess SE skills across six domains. It implements game-based assessment of SE skills through theory driven content and customized game mechanics. In *Hall of Heroes*, students enroll in a superhero middle school where they must build their powers and skills to make friends, resist peer pressure, and save the school from a supervillain. Children engage with characters in the school-like story world to complete six story-based social challenges relevant to real-world middle school situations. These situations are specifically tailored to require (and thereby assess) the specific SE skills of communication, cooperation, empathy, emotion regulation, impulse control, and social initiation.

As discussed earlier, SE behaviors are strongly influenced by culture and should not be assessed independent of the context in which they occur. In terms of social behavior, cultures are broadly discussed as individualistic or collectivistic. The primary purpose of this study was to compare whether performance on the SE skills assessed in *Hall of Heroes* differed for adolescent children across Malaysia, South Africa, and United States and whether these differences would be commensurate with the existing literature on cross-cultural differences in children's social skills. Later, we provide a brief description for each of the targeted skills assessed in the game and our hypotheses for this study.

Impulse Control

Recent research has identified specific social behaviors that promote positive peer relations for youth (e.g., Asher & Renshaw, 1981; Coie et al., 1999; Dodge & Feldman, 1990; Merrell & Gimpel, 2014). Drawing from this, *Hall of Heroes*

targeted six SE skills which have consistently been shown to impact social, emotional, behavioral, and academic outcomes. These six SE skills are communication, cooperation, emotion regulation, empathy, impulse control, and social initiation. The game presents a series of six virtual simulations specifically crafted to elicit the target SE skill and require the application of that skill to solve the presented social challenge. Furthermore, scenes were scripted so as to address unique social and developmental challenges of early adolescence (Fenstermacher, Olympia, & Sheridan, 2006; Gee, 2003; Khanna & Kendall, 2010). Impulse control is defined as the ability to control one's behaviors during the process of achieving a goal. In *Hall of Heroes*, impulse control is assessed via a child's ability to follow teacher directions, to demonstrate time-management skills, avoid distractions, and knowing when to utilize resources provided for the purpose of meeting a goal. Individuals with issues of impulse control often have difficulty paying attention to tasks or staying on track and often fail to follow through on instructions. According to available literature, adolescents from United States and Africa tend to focus on objects central to their visual field (Craig et al., 2015; Kashala-Abotnes, Lundervold, Sommerfelt, & Tylleskär, 2006) whereas East Asians like Malaysians tend to pay more attention to contextual information in a visual scene (Bakare, 2012; Imada, Carlson, & Itakura, 2013). However, there is very little evidence on practical differences between these three cultures on impulse control (Davis, Takahashi, Shinoda, & Gregg, 2012; Meyer, Eilertsen, Sundet, Tshifularo, & Sagvolden, 2004).

Communication

Communication is defined as what you say and how you say in *Hall of Heroes*, it is assessed via a player's ability to demonstrate receptive and expressive communication skills in the classroom (for instance, a player must provide a summary of a lecture for a classmate who arrives late before teaming up to complete a quiz game). This includes the ability of a player to interpret the question and to express the player's thoughts and feelings. This kind of direct communication is hypothesized to be more prevalent in individualistic cultures by researchers (Gudykunst et al., 1996) and less in collectivistic cultures like Malaysia and South Africa which communicate indirectly and use concrete self-descriptions than individualistic cultures like United States (Eaton & Louw, 2000).

Cooperation

Cooperation is defined as the ability to work with others as a team and in *Hall of Heroes*, this skill is assessed via players ability to use cooperation and teamwork skills to complete a task while also considering thoughts and feelings of his or her teammates in the decision-making process (players collaborate with peers on

a scavenger hunt on the survival trail). The self is defined as independent in societies where individualism is the dominant societal value while it is defined as interdependent in collectivistic cultures where societal value is the dominant societal value (Markus & Kitayama, 1991). As a result, those in individualistic societies define personal goals as more important than group goals; the opposite is true in collectivist societies (Schwartz, 1990; Triandis, 1988). Since cooperation diminishes personal resources that could be used to achieve personal goals, those in individualistic cultures would be more likely to avoid cooperation (Spence, 1985; Wagner, 1995).

Research has found that individualistic cultures (like the United States) may ignore groups if goals conflict with personal desires, while collectivists (like Malaysia and South Africa) may ignore their own personal desires to achieve group goals (Wagner & Moch, 1986). As such, good performance of tasks under cooperation requires effective team working.

Social Initiation

Social initiation is defined as the inclination and ability to start and maintain social interactions. In *Hall of Heroes*, social initiation is assessed via the player's ability to initiate positive and appropriate social interaction with a new group of students (for instance, in a scenario in the game—A player enters the cafeteria with a friend and decides where and with whom to sit. The player must choose between an empty table, a table with two classmates unknown to the player, or a table with classmates known to the player). In a collectivist culture, where strong emphasis is placed on group cohesion if a player approaches an empty table or the one with unknown classmates; he or she may be perceived as social assertive which as a competency may be perceived as detrimental to group harmony. In individualistic cultures that promote personal beliefs and norms, assertiveness is encouraged and is a strong indicator of positive social skills (Rubin, Coplan, & Bowker, 2009). However, a recent study has argued that the changing economic and political climate in urban collectivist societies is being accompanied by preferences for more assertive, yet competent, social behavior (Chen, Cen, Li & He, 2005).

Empathy

Empathy is defined as an ability to identify and understand others' feelings. This skill is assessed in *Hall of Heroes* via the player's ability to employ empathetic skills to help a classmate, even when the classmate may not be sure of what they need (for instance, a player attending power training class must choose between helping a peer who is upset and playing fun games with classmates). Higher scores were given for choices that reflect empathetic concern. Based on the theoretical evidence, people from individualistic cultures which have a more

individualized view of well-being resulting from the actions of the individual agent (Dalsky, Gohm, Noguchi, & Shiomura, 2008; Kitayama & Markus, 2000), people from collectivistic cultures may be more likely to feel empathy for others because their sense of well-being may be more intertwined with others.

Emotion Regulation

In *Hall of Heroes*, emotion regulation is identified as the ability to identify and manage one's feelings, assessed via the player's ability to regulate emotions in order to stay focused, communicate appropriately with adults, demonstrate maturity when faced with the temptation to gossip, and resist revenge when given the opportunity. Literature suggests that collectivistic cultures emphasize the maintenance of cohesion within the group and therefore, control of emotion has high priority (Friedlmeier, Corapci, & Cole, 2011; Potter, 1988). Individualistic cultures, on the other hand, value and promote uniqueness, separateness, and autonomy (Markus & Kitayama, 1991). Therefore, emotions are seen as important personal experiences, and their expression is the individual's right (Safdar et al., 2009).

Materials and Methods

Sampling Method and Size

This study was a part of ongoing larger study *Digital Intercultural Exchange Program* at the Institute. The sample for the study was recruited from three public schools. For the purpose of the study, middle school students from the age-group of 13 to 14 years were selected based on school willingness of schools for participation and an interest in using games for socio-emotional skills assessment.

Since the participants of the study were minors, indirect consent was sought, and school teachers signed consent forms on behalf of the students. The teachers were asked to read out the contents of the consent form and help students understand the same. The parents were informed about the study by the school. Since 65 player licenses were available for the game, the sample was chosen randomly from the large data set of interested students. The study was conducted with 24 Malaysian middle school students (5 males and 19 females, mean age = 14 years, $SD = 0.48$), 20 South African middle school students (5 males and 15 females, mean age = 14.8 years, $SD = 0.85$), and 19 American middle school students (9 males and 10 females, mean age = 13.7 years, $SD = 0.46$). The racial distribution was as follows, the students from the United States were 100% Caucasian; those from South African students were 79% Black South African and 21% of Zimbabwean origin; while the Malaysian were Christians and Muslims.

Measures

Hall of Heroes. *Hall of Heroes* is currently available only in English and hence it was important that all participating students were familiar with English. Even though English was the native language for only students from the United States, the schools from Malaysia and South Africa were both schools where the medium of instruction was English and thus all participating students had at least 8 years instruction in English. Furthermore, all three schools confirmed their familiarity with the English language and the same version of the game was deployed across schools from three countries for the assessment. In addition, in *Hall of Heroes*, all presented text is read aloud to students which minimizes the need for reading proficiency in English.

Procedure. Students were asked to complete all six scenes of *Hall of Heroes* in one sitting of 45 minutes. Teachers assisted students in accessing the game but provided no additional support for children's game play behaviors or in-game choices. Each student was provided a unique student identification number for game logging and to ensure anonymity of the data. Teachers introduced *Hall of Heroes* to the students by saying:

> Today you get to play an online game for 45 minutes. You'll get to create an avatar to represent you in the game and customize how it looks. Your avatar will be a student at *Hall of Heroes*, a virtual school where the students are learning to be super heroes. In each scene there will be a problem: maybe you can't find your class, or there might be students who are bothering you. Try your best to solve these problems just like you would if they happened at your real school.

Hall of Heroes scoring metrics. As students interacted with the game, their performance was continuously monitored. The software collected data on every player action, including menu choices and in-game behaviors such as objects and areas of the scene the player clicked on. For dialogue, students had the opportunity to choose between different dialogue options using a menu-based user interface. Typically, dialogue choices included different text and tones of voice together, while in some cases, choices included identical text with differences in dialogue articulated by different tones of voice only. Behavioral metrics in the game included explicit behavioral menu options, such as choosing to bully a child at lunch, as well as more hidden behavioral choices, such as whether the student was punctual in attending classes for the super hero training in the story world. The scoring algorithm for each social challenge scene is tailored to that scene's social goal and categorizes students' performance by combining menu choices with dialogue and behavioral indices for each social challenge into one of three categories: Emerging (student particularly struggled with the skill), Improving

(student had some difficulty with the skill in some tasks of the game), and Proficient (student has mastered the skill).

Results

Student's Experience of Hall of Heroes

Feedback from the teachers revealed high levels of adolescent engagement and numerous positive comments about the game. Adolescents became familiar very soon in navigating the game *Hall of Heroes*. Researchers observed very few requests for technical help except from the students of South Africans due to slow Internet connectivity.

The analysis of socio-emotional skills was restricted to comparing female students across the three countries for the following reasons. There is an abundance of past research that has shown gender differences in SE skills with females performing better than males (Garaigordobil, Maganto, Pérez, & Sansinenea, 2009; Schonert-Reichl & Offer, 1992). In view of this, it is important that any claims that made for SE skills in adolescents include matched numbers participants of each gender. As described in the article, this was not the case. Furthermore, in order to make gender comparisons across cultures, the number of participants across cultures needs to be comparable. As described earlier, the comparisons across males were not matched but those across females were, hence this study focused only on comparisons for female adolescents across cultures. Due to large variations in sample among the male students across three countries, since it is known that gender has an impact on children's social skills, and the number of females was comparable across the countries, the remaining analysis is focused on comparing female students across the three countries.

Categorical Differences

Based on their performance in the game *Hall of Heroes*, students were categorized into one of the three categories: Low (Emerging), Medium (Improving), and High (Proficient) (see definitions earlier). Since most of the adolescents of all three countries were assigned to *medium* and *high* categories for each SE skill, the analysis focused only on exploring these classifications between cultures as shown in Figure 1. To determine differences in the number of adolescents assigned to the *medium* and *high* categories based on culture, we conducted chi-square analyses. We also calculated odds ratio (OR) and confidence intervals to better understand the magnitude of differences in these categorizations between the three cultures and to examine the likelihood of one group of students to be categorized as *medium* or *high* compared with the other group.

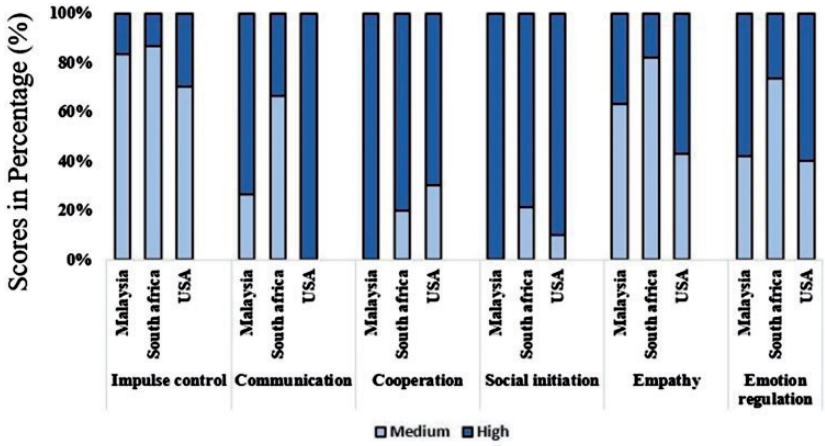

Figure 1. Categorization of adolescents' scores for each skill from Malaysia, South Africa and United States.

Chi-Square Statistics and ORs Between Malaysia and South Africa

As presented in Table 1, significant differences were obtained in the number of adolescents' from Malaysia and South Africa categorized as *medium* and *high* for communication $\chi^2(1,\ N=34)=5.53,\ p<.05$; cooperation $\chi^2(1,\ N=34)=4.17,\ p<.05$; and social initiation $\chi^2(1,\ \mathrm{N}=34)=4.17,\ p<.05$. For all these SE skills, Malaysians were more likely to be categorized as *high*, and South Africans were more likely to be categorized as *medium*.

A comparison between South Africa and United States (Table 2) showed significant differences between in communication skills, $\chi^2\ (1,\ N=25)=11.11$, $p<.001$. Adolescents from South Africa were more likely to be categorized as *medium* in communication, while those from United States were categorized as *high*. In addition, there was an OR (=18) representing 18 times increased likelihood that South Africans were categorized as *medium* in communication skill.

As shown in Table 3, significant differences were obtained between adolescents from Malaysia and South Africa categorized as medium *and* high for cooperation $\chi^2(1,\ N=29)=4.17,\ p<.05$. Adolescents from United States were *medium* on cooperation while those from Malaysians.

Also, OR(=21.23) representing 21 times increased likelihood that Malaysians were categorized as *high* in cooperation.

Correlation Analysis

Bivariate correlations were conducted for total scores between six subscales of *Hall of Heroes* to determine the degree to which the six subscales were

Table 1. Number of Adolescents From Malaysia and South Africa Classified as Medium and High.

		Medium					High				
Skill	Group	*n*	Chi-squared	*p*	Odds ratio	CI (95%)	*n*	Chi-squared	*p*	Odds ratio	CI (95%)
Impulse control	Malaysia	15	0.344	.558	0.58	0.09–3.70	3	0.04	.841	1.22	0.18–8.43
	South Africa	13					2				
Communication[a]	Malaysia[c]	5	5.536	.019*	0.18	0.04–0.79	14	5.536	.019*	5.6	1.27–24.64
	South Africa[b]	10					5				
Cooperation[a]	Malaysia[c]	0	4.168	.041*	0.09	0.01–0.94	19	4.168	.041*	11.17	0.23–33.88
	South Africa[b]	3					12				
Social initiation[a]	Malaysia[c]	0	4.168	.041*	0.09	0.01–0.94	19	4.532	.032*	3.09	0.48–19.83
	South Africa[b]	3					11				
Empathy	Malaysia	12	0.035	.851	1.14	0.28–4.58	7	2.38	.123	3.79	0.65–21.95
	South Africa	9					2				
Emotion regulation	Malaysia	8	3.316	.069	0.26	0.06–1.12	11	3.316	.069	3.78	0.88–16.32
	South Africa	11					4				

CI = confidence interval.

[a]Significant chi-squared value for either the Medium or High category.

[b]Interpretation for the (Medium) odds ratio.

[c]Interpretation for the (High) odds ratio.

Table 2. Number of Adolescents From South Africa and United States Classified as Medium and High.

		Medium					High				
Skill	Group	*n*	Chi-squared	*p*	Odds ratio	CI (95%)	*n*	Chi-squared	*p*	Odds ratio	CI (95%)
Impulse control	South Africa	13	1.042	.307	2.79	0.37–20.85	2	1.042	.307	0.36	0.05–2.69
	United States	7					3				
Communication[a]	South Africa[b]	10	11.111	<.001	18	1.75–71.31	5	11.111	<.001	0.05	0.01–0.57
	United States[c]	0					10				
Cooperation	South Africa	2	0.198	.656	0.47	0.05–3.97	13	1.021	.581	0.54	0.09–3.36
	United States	3					7				
Social initiation	South Africa	3	2.273	.132	2.25	0.19–25.36	11	3.175	.075	0.30	0.03–3.24
	United States	1					9				
Empathy	South Africa	9	2.163	.141	3.5	0.64–19.20	2	2.339	.126	0.23	0.03–1.62
	United States	3					4				
Emotion regulation	South Africa	11	2.778	.096	4.12	0.75–22.69	4	2.778	.096	0.24	0.04–1.32
	United States	4					6				

CI = confidence interval.

[a]Significant chi-squared value for either the Medium or High category.

[b]Interpretation for the (Medium) odds ratio.

[c]Interpretation for the (High) odds ratio.

Table 3. Number of Adolescents From Malaysia and United States Classified as Medium and High.

		Medium					High				
Skill	Group	*n*	Chi-squared	*p*	Odds ratio	CI (95%)	*n*	Chi-squared	*p*	Odds ratio	CI (95%)
Impulse control	Malaysia	15	0.286	.593	1.61	0.28–9.22	3	0.806	.369	0.44	0.07–2.74
	United States	7					3				
Communication	Malaysia	5	3.180	.075	3.21	0.32–32.20	14	3.180	.075	0.31	0.03–3.11
	United States	1					9				
Cooperation[a]	Malaysia[c]	0	4.168	.041*	0.22	0.02–2.82	19	4.421	.037*	21.23	0.35–57.11
	United States[b]	3					7				
Social initiation	Malaysia	1	0.191	.661	0.50	0.03–8.95	18	0.545	.460	0.94	0.07–11.89
	United States	1					9				
Empathy	Malaysia	12	2.885	.089	4	0.77–20.68	7	0.028	.868	0.88	0.18–4.24
	United States	3					4				
Emotion regulation	Malaysia	8	0.012	.913	1.09	0.23–5.18	11	0.012	.913	0.92	0.19–4.37
	United States	4					6				

CI = confidence interval.

[a]Significant chi-squared value for either the Medium or High category.

[b]Interpretation for the (Medium) odds ratio.

[c]Interpretation for the (High) odds ratio.

Table 4. Intercorrelations for Total Scores Among *Hall of Heroes* Subscales.

		1	2	3	4	5	6
1.	Impulse control	–					
2.	Communication	0.05	–				
3.	Cooperation	−0.03	0.03	–			
4.	Social initiation	0.05	0.13	−0.17	–		
5.	Empathy	−0.06	0.23	0.39**	−0.01	–	
6.	Emotion regulation	−0.16	0.34*	0.20	−0.02	0.42**	–

*$p < .05$. **$p < .01$.

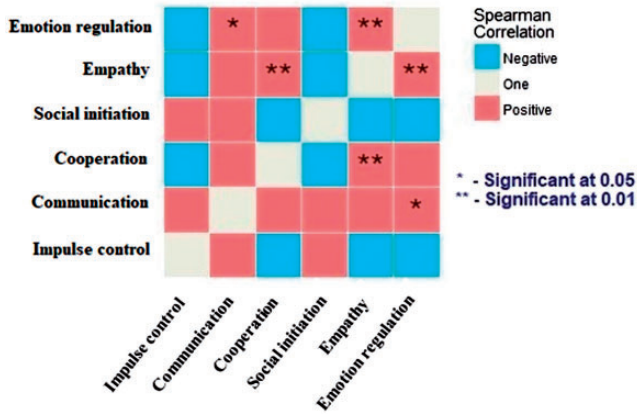

Figure 2. Heat map depicting inter-correlations for total scores among *Hall of Heroes* subscales.

independent. Table 4 displays the results of these correlations. Results found significant correlations between Communication and Emotion regulation ($r = .34$, $p < .05$), Cooperation and Empathy ($r = .39$, $p < .01$), and Empathy and Emotion regulation ($r = .42$, $p < .01$) (also presented in Figure 2).

Discussion

This study contributes to the literature on SE skills assessment through games and provides further support for the utility of this novel approach in cross-cultural classrooms. *Hall of Heroes*, a digital game-based SE skills assessment tool, was used in this study to compare performance on six specific SE skills between female adolescents in Malaysia, South Africa and United States.

Performance on the game revealed a few expected and unexpected cultural differences in game performance which are discussed later.

Comparison of SE Skills

For *impulse control*, only a small number of students were assigned to the *high* category across three cultures and showed no significant differences in performance between Malaysia, South Africa, and United States. These findings on impulse control are in concordance with the previous research suggesting cross cultural similarities on attention and hyperactivity (Davis et al., 2012; Meyer et al., 2004).

Similar performance was observed across the three cultures in emotion regulation. Several studies have suggested that cultures such as Eastern or collectivistic in natures exhibit socially engaging emotions, in contrast to Western or Individualistic cultures which exhibit more socially disengaging emotions (Kitayama, Mesquita, & Karasawa, 2006; Lim, 2016). Our results from *Hall of Heroes* indicated a different pattern. No significant differences were seen in the extent of emotional regulation exhibited by participants across cultures. In other words, our findings suggest that there is more commonality than cultural differences in emotion regulation among adolescents from Malaysia, South Africa, and United States.

For communication, results revealed interesting cross-cultural differences. We found significantly more adolescents from South Africa were classified as *medium* in communication when compared to Malaysia and United States. In fact, South African students were 18 times more likely to be classified as *medium* in communication (Table 2) when compared with students in the United States which is in concurrence with the existing literature (Gudykunst et al., 1996; Park et al., 2012).

Given the differences that may exist between the cultures in student's cooperative and competitive behaviors (Fülöp & Büki, 2013), our results on cooperation from *Hall of Heroes* revealed that Malaysians were more likely to be categorized as *high*, thus emphasizing that adolescents from collectivistic cultures a may demonstrate cooperation more than those from South Africans and even adolescents from United States who were raised in individualistic cultures. The statistics suggested that adolescents from Malaysia were 11 and 21 times more likely to be categorized as *high* in cooperation when compared with their counterparts from South Africa and United states.

Established evidence from literature (Rubin et al., 2009) on social initiation suggests that adolescents from western cultures, such as the United States, show more active engagement with their peers compared to collectivistic societies in Asia and Africa, our findings on assessment in social initiation displayed that Malaysians were more likely to be categorized as *high* social initiators when compared with South Africans and United States. This may be attributed to

the effects of migration that have led to the creation of multiethic societies (Lane, 2015). Assessments of empathy across cultures showed no significant differences suggesting that this feature may be more neurobiological in nature and less susceptible to cultural variation.

Limitations and Future Research

This study has several limitations, notably lack of criterion validity of the game *Hall of Heroes*, thus provides an ample opportunity for future research to further validate the *Hall of Heroes* SE skills assessment tool. However, the scoring metrics and category assignment on each social skill in *Hall of Heroes* has a similar algorithm of Zoo U, a rigorously validated tool for SE skills assessment for primary school children (DeRosier & Thomas, 2018). We also acknowledge that teachers familiarity with gamification of learning, or academic level of student body, were not considered for study recruitment, we do suggest that the ease of acceptance and adoption by the schools and the students is a point in favor of digital games being welcomed as alternate forms of assessment in school systems especially with adolescent children.

Second, this study included only female students from all the three countries Malaysia, South Africa, and United States, and further research is required to fully understand the demographic differences in *Hall of Heroes*.

Implications

The purpose of this study was to explore cross-cultural variations in SE skills of adolescent females between Malaysia, South Africa, and United States through game-based assessment system entitled *Hall of Heroes*, and our findings suggest that such game-based assessments for assessing socio-emotional skills across different cultures have significant potential.

In light of cross-cultural environments in classrooms across the world and given games provide a unique opportunity for stealth assessment, the results of this study will be beneficial to educators assessing SE skills among adolescents. If implemented, game-based SE skills assessment could provide a rich opportunity for timely and effective SEL intervention in schools across globe.

Authors' Note

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