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A Survey Of Rewards For Teens: Extension, Replication, and 25-year Follow-up

By

Hunter Chris King

A Thesis Submitted In Partial Fulfillment of the Requirements for the Degree of Masters of Arts  
in Clinical Psychology

Minnesota State University, Mankato

Mankato, Minnesota

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Title: A Survey Of Reinforcers For Teens: Extension, Replication, and 25-year Follow-up

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This thesis has been examined and approved by the following members of the student's committee.

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## Dedication

I would like to dedicate this manuscript to my loving, patient, and caring fiancé, Bri. Bri, you have consistently provided me with an abundance of genuine encouragement and compassion since we first met, which never subsided despite any circumstance. You are truly my rock. Your innate ability to center me during times of distress is unparalleled. I look forward to what life presents us with in the future, as our relationship will only continue to prosper with time.

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## Abstract

Changes in our immediate environment—as well as our virtual—have great potential to decrease the reinforcing effects of stimuli once identified as potent and reliable in past generations. Extant reinforcement surveys and item preferences assessments alike have shown to be a reliable mode of ascertaining potent reinforcers for various populations; however, many are outdated and may comprise of items or rewards that contemporary populations may not value. Considering the substantial environmental changes that have occurred over recent decades, in tandem with the availability of outdated reward surveys, efforts should be directed towards obtaining empirical evidence demonstrating that contemporary adolescents hold different preferences towards rewarding stimuli, compared to previous generations. The purpose of this research is to replicate and extend upon the Houlihan and colleagues' (1991) Survey of Rewards for Teens (SORT) and assess whether there is evidence of a potential, generational shift in reward preferences in high school students from 1991 to 2016. Results lend to preliminary evidence suggesting that the reward preferences of contemporary high school students' differ compared to the sample of adolescents in Houlihan and colleagues' (1991) study. In addition, a proposed, revision of the Survey of Rewards for Teens is provided, Using a principal components analysis (PCA) and psychometric assessment of the responses from a nationally representative sample of contemporary high school students, a preliminary revision of the Survey of Rewards for Teens was developed as a secondary outcome of the study.

*Key words:* Reward survey, stimuli preference assessment, behavior, behavior therapy

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### **A Survey Of Rewards For Teens: Extension, Replication and 25-year Follow-up**

Changes in our immediate environment—as well as our virtual environment (i.e., Internet and Social Media)—have great potential to decrease the reinforcing effects of stimuli once identified as strong and reliable in past generations. Likewise, change has the ability to introduce novel and more powerful stimuli. This forces us to eschew the haphazard acceptance of reinforcer effectiveness that Kazdin (1994) warned about, and to periodically re-evaluate reinforcer effect and applicability.

Over the past few decades, contemporary societies have undergone distinct environmental changes; many of which have encouraged people to adapt by developing strong, personal associations with more powerful stimuli. An example of this is demonstrated by the static increase of social media usage emanating from societies' technological progression and acceptance. Environmental shifts coupled with the introduction of new, more effective reinforcers, have drawn concern from experts in behavioral analytics; in particular, regarding their application in behavioral programs.

#### **Impact of technology on reinforcer preference**

Scientific innovation has certainly made everyday life more convenient. Increased levels of convenience permits individuals to perform certain activities with great ease, thus, encouraging future repetition of these behaviors (i.e., reinforcing effect of convenience). For example, most individuals now have the means to easily and readily communicate with people in real-time (e.g., Internet, cellular communication, Skype), across vast distances, through various modes of communication. In addition, many individuals also have the means to access the Internet within seconds, providing an unremitting resource of information at their fingertips.

This level of technological convenience may, on an individual basis, play a large role in the persistent use of technology witnessed over recent generations.

The invention and progression of cellular/wireless communication in itself is evidence of how far the United States has advanced, technologically, over recent decades. According to the results of a recent survey disseminated by the Cellular Telecommunications and Internet Association (CTIA) (2015), three-quarters of American adults own a smartphone. This statistic suggests that adolescents and emerging adults are engaging in activities conducive to the current, digital age, which were previously unavailable to past generations.

### **Generational shifts in reinforcer preference**

Substantial differences exist in the nature of commodities witnessed in the 1980s and 1990s', compared to the digital-age contemporary youth are accustomed to. Due to advancements in technology coupled with a readily accessible virtual-entertainment, there appears to have been a shift in contemporary value-systems across various populations; in particular, adolescents and emerging young adults.

Today's adolescents and young adults were born into an environment vastly different compared to those born in the late 1980's and early 1990's. As such, they have little to contrast their immediate environment with, instilling in them a specific value-system for commodities relative to environments they are accustomed to. To illustrate, today's youth (i.e., born after 2000) were born into an environment replete in technology that has an ability to occasion various, novel means of entertainment and social interactions. For example, Apple's FaceTime (i.e., video-telephony) allows people to converse with a friend in real-time at long distances, while contemporary game consoles have the capability to accurately portray interpersonal

interactions and complex human emotions. Concepts for such entertainment may have emerged in the late 20<sup>th</sup> century; however, they were not readily available for public use until the early 21<sup>st</sup> century (Tibken, 2014). In contrast, adolescent populations born in the late 20<sup>th</sup> century were not accustomed to, nor had they access to such advanced technology. For example, portable music in the 1990's comprised primarily the Discman with CDs, while currently (i.e., 21<sup>st</sup> century), MP3 players, smartphones, and Apple's iPod have the ability to hold an abundance of media-data above and beyond that of the outdated Discman. Another generational-contrast can be made regarding T.V. and movie viewing. In the typical 1990's household, watching television primarily comprised of sharing screen-time with your family (Higgins, 2016), and in order to watch a recently produced film, a visit to the local video store or theater was warranted. In contemporary society, many households have veered towards streaming videos (e.g., Netflix, Hulu), and those still using cable-providers now have the ability to pause, rewind, fast forward, and record T.V. shows in real-time, facilitated by a digital video recorded (DVR).

Investigating changes in preferences over time has not gone unnoticed by longitudinal behavior analysts. In fact, a number of studies have shown that preferences, in fact, vary over time (e.g., Carr, Nichoson & Higbee, 2000; Mason, McGee, Farmer-Dougan, & Risley, 1989). There is, however, one study whose results suggested that preferences (e.g., leisure activities) were relatively stable over time in 80% of their sample, which comprised of developmentally disabled adults (Hanley, Iwata, & Roscoe, 2006). Although Hanley and colleagues' (2006) research provides useful information for behavior analysts studying longitudinal preference changes, their sample comprised of disabled adults, making it difficult to generalize their results to other age-groups and populations (e.g., adolescents, young adults, non-clinical samples).

### **Changes in reinforcer preference across genders**

There is lengthy empirical literature underscoring the impact of gender on various psychosocial constructs, such as intelligence testing (Born, Bleichrodt & van der Flier, 1987), cognitive ability (Hyde, 1981), and personality development (Cohn, 1991; Feingold, 1994). Although, not all gender studies identify significant differences (e.g., Harbaugh, Krause & Vesterlund, 2002), a general statement can be made regarding behavioral gender-differences. For example, in a lottery-choice experiment, Schubert, Gysler, Brown and Brachinger (1999) found women to be more risk-averse, compared to males, which provides evidence that females may perceive the consequences of behaviors differently. In a similar compendium of research aimed at delineating gender-differences in impulsivity, results have consistently demonstrated that males tend to exhibit higher levels of impulsivity compared to females (Labouvie & McGee, 1986; Matczak, 1990; Miller, 1991; Nagoshi, Wilson & Rodriguez, 1991; Waldeck & Miller, 1997). In light of this evidence one may conclude that males and females differ in their behavioral tendencies and attitudes during respective contexts.

Similar comparisons can be made regarding the activities 1990's adolescents preferred, compared to today's adolescents. As illustrated in a previous section, present-day youth may hold a different value system compared to youth in the 1990's, which may be accounted for by societies' assimilation of potent environmental stimuli. Simply through direct observation, stark differences may be discerned in the activities male adolescents engage in compared to female adolescents (Eaton & Enns, 1986; Harper & Sanders, 1975). However, various individual variables certainly can convolute attempts to objectively delineate differences in gender preferences (e.g., individual differences, environment, culture, etc.).

Holding these challenges in mind, some developmental research has demonstrated that children, do in fact, prefer toys that are aimed towards their specific gender (Carter & Levy, 1988; Martin, Eisenbud, & Rose, 1995). As such, this provides further evidence that males and females, in early developmental stages, exhibit different attitudes towards reward-preferences. For example, games engineered by toy companies are advertised as either androgynous or gender-specific. In an effort to remain current, the toy industry has made alterations to the types of toys developed. To illustrate, the game, *Girl Talk: Truth or Dare*, emanated in the 1990's and was shown to be partial among female youth (Carlstone, 2016). This is a drastic difference in commodities sought out by today's female youth, which is evidenced by the increasing number of youth owning a smartphone in early teenage years (PEW, 2015). Likewise, the same can be said for male youth, for example, the Super Nintendo Entertainment System received great popularity among 90's male youth and female youth. However, according to the Toy Insider: 2016 Holiday Gift Guide, today's male youth highly sought out the *Air Hogs Connect: Mission Drone*.

### **Importance of reinforcement surveys**

A reinforcement survey or item-preference assessment is essentially a measure comprised of items or activities that a certain population may find rewarding (e.g., pizza, sporting event, going to movies). Although diverse types of reinforcement surveys exists (e.g., paired stimulus preference assessments, multiple stimulus without replacement assessments, single-stimulus preference assessments), their principal use is to identify stimuli or rewards that will functionally reinforce an appropriate behavior.

Depending on the client's problem behavior and a thorough case conceptualization, the components that comprise the selected behavior therapy may vary. However, one key and



common component of behavior therapy, namely positive reinforcement, has long been utilized amongst behavior therapists as an intervention to increase and or encourage the frequency of an adaptive behavior (Piazza, Roane & Karsten, 2011). Behavior therapists then strive to identify potent stimuli that will function as a reinforcement for the new behavior—a salient component of behavior therapy programs used in the beginning stages of addressing problem behavior(s). Once the preferred item has been selected via a reinforcement survey, or through some other means of direct or indirect observation, the item can then be provided to the client contingent on their use of the appropriate behavior. The ultimate goal of positive reinforcement is to strengthen the client's association between their adaptive behavior and subsequent obtainment of a preferred reward, while simultaneously weakening the association between their problem behavior and the respective consequence maintaining it. Measuring the effectiveness of a preferred reward is outside the scope of this paper; however, lengthily empirical literature on this topic is provided elsewhere.

## **Literature Review**

### **Review of reinforcement surveys and item preference assessments**

The formal development and validation of a single-stimulus assessment was first undertaken by Pace, Ivancic, Edwards, Iwata, and Page (1985) with the purpose of identifying stimuli that would act as functional reinforcers for individuals with severe developmental disabilities. Pace et al. (1985) laid the groundwork for further development of stimulus preference-assessments. Moreover, lengthy empirical evidence consistently lends to their efficacy in identifying functional reinforcers for respective clinical and non-clinical populations, including older adults with cognitive impairments (Fisher, Buchanan, & Haden, 2008), persons

diagnosed with schizophrenia (Wilder, Wilson, Ellsworth, & Heering, 2003), and adolescents with affective-behavioral disorders (Paramore & Higbee, 2005).

Behavior therapists typically will use some variation of an item-preference assessment when attempting to identify stimuli (i.e., items, commodities) that their client prefers. As stated previously, once the preferred stimuli has been identified, it can be incorporated into a behavior therapy regime to either increase the frequency of a more appropriate behavior and or reduce the frequency of a specific problem behavior.

### **Existing population-specific reinforcement surveys**

In an attempt to delineate the reinforcing value of activities with and without alcohol in young adults struggling with alcohol abuse, Hallgren, Greenfield, and Ladd, (2016) developed and validated the Adolescent Reinforcement Survey Schedule-Alcohol Use Version with College Drinkers (ARSS-AUV); however, the ARSS-AUV was not the first item preference-assessment developed for persons struggling with substance abuse. Murphy, Correia, Colby and Vuchinich (2005) developed the Adolescent Reinforcement Survey: Schedule Substance Version (ARS-SSV), which has allowed both practitioners and researchers to compare the reinforcing effects of different activities when alcohol is consumed versus during periods of cessation.

Aggregating reinforcer preference-data from 175 clinical cases, Phillips, Fischer and Ratan (1977) developed and reported the psychometric properties of an age-appropriate reinforcement survey for children. Test-retest reliability was moderate and suggests the test was reliable over seven-days. Additionally, another survey for children was developed by Cautela and Brion-Meisels (1979), namely the Children's Reinforcement Survey Schedule (CRSS), and

has shown to be useful for children in kindergarten through 3<sup>rd</sup> grade, while a long-form exists for grades 4-6.

Tourigny-Dewhurst and Cautela (1980) developed the Special Needs Reinforcement Survey Schedule (SNRSS), for children with ages ranging from infancy to 12-years, exhibited behavioral problems, an intellectual disability, and who were developmentally delayed or had a primary diagnosis of autism spectrum disorder. Given the complexity of these developmental issues, in tandem with the potential challenges that arise during behavior therapy and basic research with said populations, this survey is quite valuable, given its strong psychometrics properties and ease of use in both applied and basic research settings.

Jones, Mander-Provin, Latkowsi, and McMahon (1988) constructed a reinforcement survey for children in inpatient psychiatric hospitals based on an unpublished version of the SORT (Houlihan & colleagues, 1991). Aggregating data from 19 children (aged 9-17 yrs.), Jones and colleagues (1988) identified various domains that comprised the reinforcement survey (e.g., Sports, Food, Entertainment, Excursions, Music), and were shown to have reinforcing effects on the children's behavior.

The Survey of Rewards for Teens (SORT) was developed by Houlihan, Jesse, Levine, and Sombke (1991), and was shown to be a reliable instrument for identifying potential, preferred stimuli in high school adolescents and emerging young adults. Houlihan and colleagues' (1991) sample comprised of 218 high school students located across three cities in Minnesota and Utah. The final construction of the SORT consisted of 56 rewards and eight domains: Sports, Food, Entertainment, Excursions, Hobbies, Social Activities, School Related Activities, and Other.

Lastly, Houlihan, Rodriguez, Levine, and Kloeckl (1990) developed the Geriatric Reinforcement Survey (GRS), which expanded upon the Reinforcement Survey Schedule previously developed by Cautela and Krastenbaum (1967). The GRS comprises of two formats: 1) one designed for persons over the age of 65 with the ability to read and write; and 2) one designed to be filled out by relatives and staff acquainted with a person over 65 years of age who struggle with reading, writing, and comprehension. Both versions of the GRS demonstrated strong psychometric properties, leading to its applicability for both incapacitated and high functioning geriatric populations.

As seen, there exists a host of population-specific reinforcement surveys within the behavioral and developmental-literature. However, each of the aforementioned surveys were constructed in the late 1970's and 80's, with the exception of Hallgreen and colleagues' (2016) ARSS-AUV, which draws concern regarding their validity. Previously noted, our environment had undergone substantial changes over the past few decades, which has altered (i.e., increased) the availability of rewarding stimuli and commodities, influencing people to develop preferences for novel and potentially more potent stimuli. Considering the distinct environmental changes that have ensued over recent decades, item-preference assessments and reinforcement surveys alike should comprise of rewards relative to the values of a contemporary populations.

### **Reinforcer roles in the structuring and delivery of behavior modification programs and procedures for youth**

Items that have shown to reinforce a behavior play a salient role in behavior modification programs. Although the definition of reinforcement varies slightly among behavioral analysts, Catania (2013) provides a basic and easily interpreted description, "...always increases responding relative to what it would have been like without reinforcement" (p.37). To illustrate,

an employee for a company receives a paycheck at the end of the pay period, allowing (s)he to purchase commodities for pleasure or to cover living-expenditures. The pay check acts as reinforcement, in that the worker continues to work with the expectation they will receive monetary compensation for their time spent at work. This applied example of how monetary compensation functions as a reinforcement of job attendance (and occasionally job performance) can be generalized to the approach undertaken by behavior therapists when confronted the task of addressing an individual's primary concern or behavior.

Take, for example, a child who refuses to comply with the requests or demands made by their parent(s) or guardian(s). An initial step in addressing this problem behavior (e.g., non-compliance) would be to first identify what is maintaining or reinforcing the child's propensity to disregard parental requests or demands. Upon discerning the behavioral contingencies that constitute the child's non-compliant behavior, the behavior therapist may wish to identify other stimuli the child finds pleasurable, for example, watching television after completion of homework or going to their favorite restaurant. This process can be undertaken in multiple ways and typically involves the use of stimulus-preference-assessment or some variation of observation. Once the therapist distinguishes a stimulus the child expresses interest in, it can then be integrated into a behavioral modification program.

There exist empirically supported behavioral treatments that have shown to increase desirable behavior and or reduce problematic behavior. However, one such method, namely differential reinforcement (DR), is quite simple to integrate into a behavior modification regime, and has shown to work exceptionally well with children with disabilities and individuals with severe problem behaviors (Risley, 2005). As spoken to previously, by systematically arranging for reinforcers (i.e., preferred stimuli) to occur more frequently after the occurrence of an

appropriate behavior (i.e., consequences of behavior), DR has the effect of strengthening the appropriate behavior and weakening the operant contingencies that maintain the problematic behavior.

Behavioral therapists must consider many variables when introducing new, operant contingencies into a client's environment, for example, the topography and behavioral functions of preferred stimuli tend to be largely age-specific, depend on idiosyncratic characteristics (e.g., human affect, cognition, and behavior), and may be based on the individual's historical and current environmental conditions and events (Drossel, Rummel, & Fisher, 2009)

### **Rationale**

Reinforcement surveys and stimulus preference assessments alike have demonstrated their efficaciousness in ascertaining preferred rewards across diverse populations (Houlihan et al., 1991; Jones et al., 1988; Murphy et al., 2005; Phillips et al., 1977). Although extant reinforcement surveys address specific populations and demonstrate strong psychometric properties, many of them were developed over 20 years ago and may be outdated. As such, efforts should be undertaken to replicate dated reward surveys to re-assess their effectiveness for contemporary populations.

Substantial environmental differences have ensued since the late 20<sup>th</sup> century, largely in part to technological-innovation, which has provided contemporary society and persons access to potent reinforcers that were once unavailable to past generations. In light of said changes, reinforcement surveys and item preference-assessments should comprise of items (i.e., stimuli, rewards) that exemplify the rewards or commodities relative to contemporary populations. In a preliminary effort to address these concerns, the present study aimed to replicate and extend

upon Houlihan and colleagues' (1991) Survey of Rewards for Teens (SORT). In this fashion, the investigator noted any observed generational trends in reinforcer preferences, and more importantly, addressed five research questions central to the present study's purpose:

- 1) Is there evidence of a generational shift in reinforcer preference from 1991 to 2016?
- 2) Is there evidence of a generational shift in reinforcer preference relative to academic high school grades, from 1991 2016.
- 3) Are there noteworthy gender-differences within the 2016 data?
- 4) Did the 2016 sample of high school students prefer the new rewards provided by teacher recommendation and PEW (2915) research?
- 5) Should the SORT be restructured based on the results 2016 data?

## **Methods**

### **1991 SORT Development**

As described elsewhere, the Survey of Rewards for Teens (SORT) (Houlihan and colleagues, 1991) was developed to assess the intrinsic, perceived value of preferred rewards for high school students. Face-validity was accomplished by inviting 2,162 high school students, 96 teachers from the schools, and 30 randomly selected parents of some of the students, to develop a list of the most potent rewards presumed to be sought by high school students (Atkinson, et al., 1984). Of those invited, 48 students, 12 teachers, and 18 randomly selected parents constructed a list of 627 potential rewards. Houlihan and colleagues (1991) reduced the list to 55 rewards representing each of the following eight categories: (a) Sports; (b) Food; (c) Entertainment; (d) Excursions; (e) Music, Crafts, and Hobbies; (f) Social activities; (g) School-Related Activities; and (h) Other. The SORT was disseminated to 216 high school students (approximately 60%

female) who were randomly selected from 3158 high school students within three cities located in Minnesota and Utah. Test-retest reliability was moderate to strong,  $r_s=.69$ ,  $p < .01$ ,  $N=149$ , indicating the SORT is reliable over a two-week period. Results of the Houlihan and colleagues' (1991) study are illustrated later in the paper.

### **2016 SORT development**

The current study protocol received IRB approval from a mid-sized, comprehensive (in the Carnegie Classification) university in the Midwest. In a fashion similar to Houlihan and colleagues' (1991), ten high school teachers—either current or recent—were recruited to ascertain potent rewards they believed would be highly sought after by contemporary high school students. Teachers were mailed a consent form and paper-version of the original SORT, and were asked to provide recommendations for omitting current items or enlisting new ones based on their experience with high school students. In addition, potential new SORT rewards were identified using data from a 2015 PEW technology prevalence-survey for adolescents; new SORT items are listed in later in the paper.

### **Recruitment**

Participant recruitment was undertaken by a data management collection (Qualtrics, Provo, UT); Qualtrics's sampling and recruitment methods are described elsewhere. Once the anonymous, online version of the SORT was constructed, Qualtrics disseminated a corresponding survey-link, along with a brief recruitment script to adults who had indicated on a previous, unrelated online survey that were the primary guardian of a high school student and would be willing to participate in future online surveys for compensation. The survey began with a consent form which allowed the guardian to read the study's protocol and purpose, and consent



to their child's participation. Once guardians provided their consent, they were instructed to have their child read over a separate, age-appropriate consent form, and if interested, consent to participate. Upon completion of the online survey, the guardian of the adolescent received compensation of one-dollar which was credited to the guardians' existing online-survey account by Qualtrics.

### **Self-report survey**

The online-version of The Survey of Rewards for Teens (SORT) comprises of 55 rewards within 8 categories; each reward represents a single question. Participants were asked to rate how much they prefer each reward on a 5-point Likert scale ranging from 1 (*not at all*) to 5 (*very much*). Resulting responses from teacher recommendations coupled with data from the Pew (2015) adolescent technology-use survey, facilitated the construction of a list of nine additional rewards that were later assessed for potential inclusion, and are provided in Table A1 (refer to Appendix A). In addition, two existing SORT items were rephrased to remain current with terms typically used and witnessed in today's society. Specifically, the original SORT item, playing video games (1/2 hour), was rephrased to Playstation/Xbox (1/2 hour), while similarly, going online, was rephrased to browsing the internet. For an accurate comparison of the 1991 to the 2016 data, both new and rephrased SORT items were excluded from primary comparisons; however, their inclusion into the proposed revision of the SORT was determined via their psychometric value within the most relevant category.

### **Data analyses**

To address each of the five research questions stated previously, the use of descriptive statistics (e.g., means, standard deviations, and frequencies) were the primary method for comparing continuous variables between 1991 SORT data and the 2016 SORT data.

- RQ1 was addressed by examining mean rank-differences among the 20 most and least popular rewards between the 1991 SORT and 2016 SORT; new SORT items were not included.
- RQ2 was addressed by examining mean rank-differences among the 10 most and least popular rewards between the 1991 SORT and 2016 SORT; new SORT items were not included.
- RQ3 was addressed by examining mean rank-differences among the 10 most and least preferred rewards in 2016; new SORT items were not included.
- RQ4 was addressed by examining the means of *new* SORT items relative to *existing* SORT items within their respective categories, and among all 55 existing SORT items, collectively.
- RQ5 was addressed by the component structure resulting from a principle components analysis (PCA) the psychometric properties of SORT items via reliability analyses, and relevance of SORT items to specific categories.

### **Dimension reduction**

The 55 items that comprise Houlihan and colleagues' (1991) SORT were subjected to a principle components analysis (PCA) with Varimax rotation, using the statistical package for social sciences (SPSS) version 21. A PCA is primarily used to identify underlying dimensions (i.e., components) that best characterize participant response patterns for a respective instrument.

Components with eigen-values greater than one were considered significant. The assumption of an adequate sample size for a PCA varies within the literature; however it has been recommended the overall sample size be  $\geq 150$  with a ratio of at least five cases for each variable (5:1) (Pallant, 2013). Considering that the 1991 SORT structure comprises of 55 items and the present study's sample size ( $N= 283$ ), adequate power was achieved to reduce the possibility of sampling error. In addition, the PCA was instructed to force-extract only eight significant categories as to remain consistent with the eight categories the comprise the 1991 SORT. To facilitate a clear interpretation of the component structure, new SORT items provided in Table A1, except for browsing internet (1 hour) and PlayStation/Xbox (1/2 hour), were not included in the PCA; however their inclusion to the SORT was determined on the basis of their psychometric properties relative to respective categories.

In light of Houlihan and colleagues' (1991) results providing the top twenty most and least popular reinforcers (i.e., omitting rewards that were neither preferred or less preferred) ordinal data (e.g., mean ranks) were examined descriptively by way of means and standard deviations, rather than by a Spearman's Rho correlation coefficient.

**Missing data.** Three participants endorsed being over the age of 18 (e.g., 37, 38, and 51 years old), which exceeded the target populations' age-range, and were subsequently excluded from analyses. Additionally, ten participants did not report their age and were excluded from analyses due to concerns of validity. Lastly, two students indicated they were in 7th grade and 8<sup>th</sup> grade, respectively. Ultimately, the two students were included due the proximity of their age relative to high school students.

## Results

## Sample

The sample as whole is considered nationally representative (refer to Appendix J for geographic location of sample). Participant demographics are provided in Table 1B (refer to Appendix B). As seen, the sample ( $N=283$ ) comprised of a relatively uniform number of males and females (53% female). Age-group frequencies are provided in Table B2 (refer to Appendix B) and indicated a mean student age of 15.47 years old ( $SD = 1.15$ ). In addition, academic-grade frequencies, except for 7<sup>th</sup> and 8<sup>th</sup> grade, were relatively static across all four academic grades.

## **SORT comparisons: 1991 to 2016**

**Top 20 most and least popular rewards.** In a fashion similar to Houlihan and colleagues (1991), a list of the top 20 most and least popular rewards was developed for ordinal comparisons. Most and least popular reward data in 1991 and 2016 are provided Table C1 and Table C2, respectively (refer to Appendix C). As seen in Table C1, the 1991 sample listed receiving \$5 cash as the most preferred reward, followed by extended curfew, and then pizza (1 Lg.). However, 2016 data indicated that the most preferred reward for the entire 2016 sample was receiving a diploma, followed by listening to music (1 hour), and going to movie. Although mean differences in the most popular rewards suggested a shift in reward preferences between the 1991 data and 2016 data, it must be noted that there were consistencies among the list of most popular rewards for both samples, which included: extended curfew; pizza ( 1 Lg.); receiving diploma; sleeping past alarm (1 hour); talk to friend (1 hour); buying new clothes (\$50); going to a movie; and going on a family vacation.

Regarding the least popular rewards, ordinal data from the 1991 sample indicated that \$5 worth of school supplies was ranked as the least popular, followed by playing a musical

instrument (1 hour), and playing a video game (½ hour). Similar to the most popular rewards, the 2016 data has indicated a potential shift in preferences for the least popular rewards; specifically, contemporary high school students listed skiing (1 hour) as the least popular reward, followed by riding a motorcycle, and missing class. Another intriguing shift in reward preferences was observed when students from the 1991 sample listed computer time (1/2 hour) among their list of least popular rewards, while conversely, the 2016 sample highly preferred this activity and also listed computer time (1/2 hour) among their list of most popular rewards. Although the means for the least popular rewards differed between the 1991 data and 2016 data, there were, however, consistencies among the list of least popular rewards for both samples, which included: \$5 worth of school supplies; playing a musical instrument (1 hour); riding motorcycle; receiving buttons, stickers or posters; cooking; drawing or painting (1 hour); baseball (1 hour); playing board games (1 hour); skiing (1 hour); going on picnic; photography; going camping; and basketball (1 hour).

**Top 10 most and least popular rewards by academic grade.** Data for the 10 most and least popular rewards by academic grade in 1991 and 2016 are provided in Table D1 and Table D2 respectively (refer to Appendix D). In 1991, students rated receiving \$5 cash as the most popular reward which remained static among all four academic high school grades. Yet, conversely, data from the 2016 sample has indicated that the most preferred reward across all four academic grades was receiving a diploma. Houlihan and colleagues (1991) noted that 9<sup>th</sup> graders ranked missing class as a top 20 most popular reward, while the 2016 data suggests otherwise; specifically, contemporary 9<sup>th</sup> graders valued missing class considerably less as it was ranked among the least popular rewards. Interestingly, this trend remained consistent among all academic grades in the 2016 sample. Finally, In 1991, 9<sup>th</sup>, 10<sup>th</sup>, and 11<sup>th</sup> graders list high among

the most popular rewards, going to a party, while in 2016, this reward was neither ranked as a top 10 most or least popular reward for all academic high school grades.

As seen from Table D1, most popular rewards varied among academic grades in 1991: 9<sup>th</sup> graders (playing board games(1 hour)); 10<sup>th</sup> graders (\$5 school supplies); 11<sup>th</sup> graders (swimming(1 hour)); and 12<sup>th</sup> graders (reading(1 hour)). Yet, for the 2016 sample, all academic grades listed skiing (1 hour) as the least popular reward. There was, however, a similar result identified between the academic grades for 1991 and 2016, such that listening to music was listed among the most popular rewards for both samples.

### **Collective assessment of perceived value of new items**

As stated previously, potential new rewards were identified *a priori* on the basis of teacher recommendation and a recent PEW (2015) technology survey. Upon the inclusion of said items to the SORT structure, mean ordinal data were examined relative to the top 20 most and last popular rewards (see Table E1 in Appendix E for complete data). As seen, a majority of the items, namely, lacrosse (1 hour), energy drink, soccer (1 hour), food truck visit, and bowling (1 hour), were listed among the least popular rewards. However, receiving a \$5 gift certificate to a favorite store, using Facebook or Instagram (1 hour, and browsing the internet (1hour) were listed among the most popular rewards. Playing X-box /PlayStation (1/2 hour) was listed neither among the most popular rewards nor the least popular rewards, but rather was ranked 29 out of 65 items (55 items excluding new items). Similarly, the reward of a smoothie (any flavor) ranked 32 out of 65 items..

**Assessing perceived value of new items within categories.** New reward means were also compared to existing SORT item means within their corresponding categories (refer to

Table F1 in Appendix F for complete data). New rewards within the Sport category displayed means ranging from fair to less preferred. Specifically, the relative means of lacrosse (1 hour) and soccer (1 hour) indicated they were less preferred by contemporary high school students, relative to the existing Sport category reward means. Bowling (1 hour), however, appeared to be moderately preferred such that it was ranked 5<sup>th</sup> out of the nine rewards within the Sport category. New reward means for the Food category were less preferred, compared to existing rewards within said category. The new reward, smoothie (any flavor), however, was more preferred relative to the other two new rewards (e.g., food truck visit, energy drink), and one existing reward (e.g., slushes). Of the three new rewards within the Entertainment category, browsing the internet (1 hour) ranked highly among existing reward. In addition, Facebook/Instagram and PlayStation/X-Box(1/2 hour) were more preferred, relative to three existing rewards, going to concert, tickets to a sporting event, and going to dance. Lastly, the new reward, \$5 gift certificate to favorite store, was ranked high among the existing rewards within the category, Other.

### **Gender differences in reward preferences**

Gender differences among the ten most and least popular rewards are provided in Table G1 and Table G2, respectively (see Appendix G). In regards to the most popular rewards, both males and females listed receiving a diploma as the most preferred reward, underscoring a consistent theme witnessed among the aforementioned 2016 analyses. Interestingly, males listed the reward, extended curfew, among their most preferred rewards; a result not seen for females. There were, however, consistencies among the most popular reward preferences witnessed for both females and males (refer to Appendix G for complete data)

For both males and females, the reward skiing (1 hour) was listed as the least popular reward, again, underscoring a theme witnessed among the aforementioned 2016 analyses.

Noteworthy were the number of sport-related rewards listed among the least preferred rewards for females, relative to males. Specifically, females listed, in addition to skiing (1 hour), baseball (1 hour), football (1 hour), and basketball (1 hour) among the least popular rewards, while males only listed skiing (1 hour). Similar to the most popular rewards mentioned previously, there were consistencies seen among the least popular reward preferences witnessed for both females and males (refer to Appendix G for complete data)

### **Full-scale principle component analysis**

A Principal Components Analysis (PCA) using Varimax rotation was conducted to assess whether or not significant themes or categories remained consistent from 1991 to 2016, and to assess the factorability of 55 SORT items. The Kaiser-Meyer-Olkin measure of sampling adequacy was .86, above the commonly recommended .6, and Bartlett's test of sphericity was significant  $X^2(1540) = 6952, p < .001$ . A total of thirteen significant components with eigenvalues greater than one were identified and explained 66.12% of the variance. In light of the high number of significant components identified by the PCA, a forced component-extraction of eight-components was chosen for a more precise and manageable interpretation- a component structure that would also be consistent with Houlihan and colleagues' (1991) SORT structure. The forced-extracted sums of squared loadings indicated that the eight components explained 22.68%, 6.85%, 5.72%, 4.92%, 3.52%, 3.21%, 2.88%, and 2.57% of the variance, respectively, while the eight components collectively explained 52.37% of the variance. Refer to Appendix H for the rotated PCA component structure and item loadings.

### **Initial component structure and reliability**



Inspection of Cronbach's alpha coefficients for each of the eight components indicated that while some components (e.g., 1, 2, 3, and 4) maintained an acceptable level of internal consistency (e.g.,  $\alpha \geq .80$ ), other components (e.g., 5, 6, 7, and 8) fell below the recommend cut-off of .80. The scale as a whole, however, displayed a high internal consistency ( $\alpha = .93$ ). In light of the subjective nature of rewards and item preferences, the component structure was reconfigured on the basis of increased component  $\alpha$  coefficients and corresponding relevance between items and components themes.

***Assessment and inclusion of new SORT items.*** Although the nine new items provided by teacher recommendation were not included into the PCA, their inclusion to relevant categories were examined per their psychometric value (e.g., reliability) and thematic relevance to respective categories. Specifically, new items, lacrosse (1 hour), soccer (1 hour), and bowling (1 hour), were binned into the category, Sports, while both rewards, downloading music and the rephrased item, browsing the internet (1 hour), were binned into the category, Hobbies. The new item, \$5 gift certificate was ultimately binned into Social Activities do to its relevance with existing items within the category and its ability to increase the reliability of said category.

New items, energy drink and food truck visit, both exhibited very low correlations with existing SORT items and provided little to no psychometric value to any of the eight components. Thus, the two items were omitted from the SORT reconfiguration and survey as a whole. Similarly, the new item, smoothie (any flavor), was not included into any component due to its weak psychometric properties relative to the existing, yet, similar item, slushes (1 glass), and was omitted from the SORT survey as well. Finally, although the new item, Facebook/Instagram was moderately preferred by the sample, it displayed low inter-item

correlation with existing SORT items with and provided little to no psychometric value for any category. Thus, the item were subsequently omitted from the revised SORT.

The PCA results had identified three items that did not load any component, which were: receiving \$5 cash, going to amusement park, and going to concert. A further inspection of their inter-item correlations among existing SORT items within the categories Social Activities and Leisure were moderate and demonstrated increased reliability coefficients for both categories, respectively. Thus, receiving \$5 cash was binned into Social Activities (component 4), while the items, going to an amusement park and going to a concert were subsequently binned into Leisure (component 6) due to their corresponding themes and psychometric value.

***Reconfiguration of PCA structure.*** Table I1 illustrates the re-binning of SORT items from their initial component-loadings to a component of more relevance. Reconfiguring item and category structure were based on relevance to corresponding categories and the item's propensity to increase the new category's alpha coefficient

In light of the aforementioned component reconfiguration—based on the PCA and reliability analyses—the proposed new SORT component-structure is provide below in Table I2. As seen, the revised SORT structure now comprises of 6 categories (items that loaded onto component 7 and 8 were reallocated to more appropriate components) each demonstrating acceptable levels of internal consistency.

The correlations among the six components were assess using Pearson Product-Moment correlation coefficients. Table I3 below revealed that a number of the components were moderately correlated, and ranged from .26-.70. Tables I1, I2, and I3 are provided in Appendix I. The proposed, revised SORT (categories and corresponding items) can be found in Appendix J.

## Discussion

The study's results present preliminary, yet empirical data lending to a potential generational shift in reward preferences between two samples of high school adolescents in 1991 and 2016, respectively. Comparisons of Houlihan and colleagues' (1991) results to the new 2016 data were descriptively examined, which led to the notion that contemporary adolescents may, in fact, endorse different reward preferences compared to adolescents of previous generations. Potential reasons for said changes are provided below.

Comparison data from the 20 most and least popular rewards lent to some intriguing results and observations. Results from Houlihan and colleagues (1991) study indicated that their sample of adolescents preferred, over all other rewards, receiving \$5 cash, while conversely, the present sample ranked receiving diploma as the most preferred reward. This distinct shift may be attributed to how contemporary adolescents perceive "success", compared to past generations. Specifically, the idea that success is primarily attained through a formal education and or training which has been consistently promoted within academia and held as a general belief by many; potentially due the exponentially increased competitiveness of the job market over past decades. This ideology certainly may have been present in the early 1990's, yet not as developed to the extent of more recent adolescent generations. Furthermore, if being successful can be distilled to a step-by step process of obtaining a formal education, many adolescents may interpret receiving a diploma as the initial step in achieving their visualized version of success.

A second, yet, behavioral interpretation can be made in regards to the shift, whereby there may be a shift from materialism to goal-orientation. To illustrate, 90's youth may have preferred to obtain tangible rewards (e.g., money, cars, clothes) due to their tangible topography and immediate reinforcing capabilities. Today's youth, however, may be less averse to the

delayed, potent reward of earning a high school diploma, whereby the diploma acts as the consequences following a very large number of successive behaviors (e.g., passing a course, meeting credit requirements), thus facilitating the path to possessing the fiscal means to obtain preferred, tangible rewards; reasons as to why contemporary adolescents may be less averse to delayed gratification are beyond the scope of this paper, however, this would be an interesting line of future research. Although there exists other ways to interpret this particular shift in reward preferences, this paper offers two plausible explanations.

Parallel to results from a 2015 PEW adolescent technology-use survey, the addition of technology-related items were highly preferred among the 2016 sample of adolescents. Specifically, the present sample indicated a high preference for browsing the internet (1 hour)–rewarded from going online (1 hour)–and using Facebook / Instagram (1 hour). Conversely, results from Houlihan and colleagues’ (1991) study suggest a low preference for computer time (1 hour)–rewarded to “browsing the Internet (1 hour)”–as it was listed among the least popular rewards.

Speculation as to why today’s adolescents prefer technology-related activities or rewards above and beyond adolescents of previous generations may be credited to society’s reliance on and preference for the convenience allotted by technological innovation. As longitudinal technology preference-data shows, adolescents usage of technology (e.g., cell phones, computers) and social media platforms have increased over recent decades (PEW, 2015). Thus, it was not surprising to see technology-specific rewards surface among the most preferred SORT rewards in the 2016 data. Increased and sustained exposure to technology, over time, certainly may have impacted the preference ratings of the aforementioned SORT items; however, an empirical explanation may provide additional insight. Specifically, technology use gained its

popularity for varying reasons, yet, it may be a generally accepted idea that technology's ability to increase convenience and provide novel means of entertainment may be the driving force to said behavioral acquisition. In other words, the pleasurable consequences stemming from technology use have potential to be so rewarding that their use continues to increase over time.

Interestingly, receiving \$5 cash was no longer the most preferred reward in the 2016 sample, compared to Houlihan and colleagues' (1991) data. This may be in part due to how money is handled today. To illustrate, in contemporary economies, money tends to be largely electronic (e.g., debit and credit cards, online bank accounts), and circulated through convenient means of storage and transfer. The notion of managing loose currency may be bothersome to some, due to the aspect of "inconvenience". This observation, however, would be strengthened had the preference ratings of a new reward characteristic of electronic banking (e.g., prepaid gift card), been examined relative to receiving \$5 cash.

In light of the vast applicability and use of reward surveys by behavior therapists and behavioral analysts, additional insight into the utility of the most preferred rewards is merited. First and foremost, the topography and characteristics of a preferred reward must be considered before their integration into a behavior modification regime. To demonstrate, in 1991 receiving \$5 cash was the most preferred reward; a reward that can easily be used to reinforce the occurrence of an appropriate behavior. However, in 2016, receiving a diploma was the most preferred reward; a reward that in order to obtain, requires the successful completion of a vast number of successive behaviors. Additional differences between the two rewards can be surmised based on the aspects of immediacy of acquisition. While a behavior therapist may certainly find value in a client selecting, receiving a diploma, as a most preferred reward, this reward has little value in its ability to reinforce behaviors as they occur in real time. However, if receiving a diploma is

chosen as a most preferred reward for a student, efforts could be directed towards developing a task-analysis or behavior-chain that would provide the student with a visual representation of what they need to accomplish in order to receive their diploma, while reinforcing the successful completion of operationalized behaviors as they occur.

A comparison of the eight components with the categories identified by Houlihan and colleagues (1991) was distinguishable. Houlihan and colleagues (1991) constructed the SORT with eight categories and 55 items, while the reconfiguration of the SORT resulted in 6 meaningful categories and 61 items—four new items (e.g., lacrosse, soccer, bowling, and downloading music) and two rephrased items (e.g., browsing internet, and PlayStation/X-Box). Teacher's postulated that the items, food truck visit and energy drink would be highly regarded by contemporary adolescents, however, neither item proved to be a fruitful addition to any category, were listed among top 20 least popular rewards, and thus were ultimately omitted from the revised SORT. Further, each category displayed acceptable levels of reliability, ranging from .72 to .85, while the scale as a whole demonstrated strong internal consistency ( $\alpha = .93$ ).

The present study provides psychometric evidence for each the SORT-R's six components, suggesting they represent distinguishable areas or domains that adolescent are typically exposed to. Further, the items comprising each component bear some relationship with the overarching theme described by the component's label. Further, the intercorrelations among the six components are moderate, lending to their distinctiveness. There was, however, a strong correlation between the components, Leisure and Social Activities, what may indicate some overlap. Despite this finding, the strength of the relationship did not reach such a level that would merit concerns regarding redundancy.

### **Conclusion and Limitations**

Some caution, however, should be taken when interpreting the results. Due to time constraints and funding issues, performing a test-re-test reliability analysis was forgone. This study was intended to be an initial step towards identifying whether or not a shift in reward preferences was observed for a non-clinical sample of high school students, and to provide speculation as to why said shift may have occurred. Secondly, SORT reward rank-order differences between Houlihan and colleagues' (1991) data and the 2016 data was also foregone due to limited resources; specifically, Houlihan and colleagues (1991) reported the top 20 most and least popular rewards for each academic grade and for the sample as a whole. As such, 10 of the 55 ranked rewards were listed in-between the two extremes were not provided in their report.

Regarding the principal components analysis, the assumption of adequate sample size was met, however, at a ratio of minimal acceptance. Literature on psychometrics proposes, at minimum, between five to ten participants per item being factorized. The reported PCA included 55 items leading to an minimal, yet acceptable sample size ranging between 275-550 participants. This may be why the PCA resulted in a drastically different SORT structure compared to the results of Houlihan and colleagues (1991).

In light of the recruitment efforts primarily tasked by the data management agency Qualtrics, issues may have arisen that were outside the control of the investigator. However, due to the long lasting reputation and reliability of data management resulting from Qualtrics's history of data collection, concerns regarding the data's validity are of less interest.

Lastly, the subjective nature of item preference assessments and reward surveys alike, presents challenges when attempting to validate the instrument; particularly so in light of the heterogeneity of preferences within non-clinical samples. Future studies are warranted to confirm and or strengthen the psychometric properties of the revised SORT. Specifically, the revised SORT would benefit from efforts to measure its ability to remain reliable over a specified period of time (i.e., test-re-test reliability) . In addition, it would be a fruitful inquiry to measure the shift in reward preferences in approximately half of the time, relative to the 25-years profiled in this study. Such an empirical examination of reward preference changes over a briefer time span may provide a more accurate depiction of when said preference changes occur, as opposed to examining the subject matter over a span of more than two decades.



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## Appendix A

Table A1

*New SORT items by presumed category*

Categories	New Items
Sports	<ul style="list-style-type: none"> <li>• Lacrosse (1 hr.) <i>tr</i></li> <li>• Soccer (1 hr.) <i>tr</i></li> <li>• Bowling (1 hr.) <i>tr</i></li> </ul>
Food	<ul style="list-style-type: none"> <li>• Smoothie (any flavor) <i>tr</i></li> <li>• Food truck visit (1 item) <i>tr</i></li> <li>• Energy drink (1 can) <i>tr</i></li> </ul>
Entertainment	<ul style="list-style-type: none"> <li>• Facebook/Instagram (1hr.) <i>tr</i></li> <li>• PlayStation / X-Box (1/2 hr.) (<i>rp</i>: playing video games 1/2 hour)</li> <li>• Browse internet (1 hr.) (<i>rp</i>: going online 1 hour)</li> <li>• Downloading music <i>tr</i></li> </ul>
Other	<ul style="list-style-type: none"> <li>• \$5 gift certificate to favorite store <i>tr</i></li> </ul>

*Note: tr* stands for teacher recommendation; *rp* stands for rephrased items.

## Appendix B

Table B1

*Participant age group and gender frequency data*

Age Group	Gender		Total
	Male	Female	
13	5	4	9
14	36	20	56
15	38	42	80
16	31	38	69
17	39	29	68
18	1	0	1
Total	133	150	283

Table B2

*Academic grade frequencies*

Academic Grade	<i>N</i>	Percent
7 <sup>th</sup>	1	.35
8 <sup>th</sup>	1	.35
9 <sup>th</sup>	75	26.5
10 <sup>th</sup>	78	27.6
11 <sup>th</sup>	64	22.6
12 <sup>th</sup>	64	22.6
Total	283	100.0

## Appendix C

Table C1

*Twenty most and least popular rewards: 1991 data*

<b>Most popular</b>	<i>M</i>	<i>SD</i>	<b>Least popular</b>	<i>M</i>	<i>SD</i>
Receiving \$5 cash	4.50	.76	\$5 of school supplies	2.50	.51
Extended curfew	4.40	.52	Playing a musical instrument (1 hr.)	2.63	.80
A pizza	4.32	.88	Playing a video game (1/2 hr.)	2.67	.96
Listening to top 40 music	4.32	.60	Riding motorcycle	2.68	1.12
Driving a car	4.30	.47	Stickers, buttons, or posters	2.78	.59
Receiving diploma	4.29	.97	Cooking	2.79	.88
Sleep (1 hr. past alarm)	4.20	.65	Drawing/painting	2.80	.61
Taking to a friend (1 hr.)	4.19	.48	Playing baseball (1 hr.)	2.81	.60
Going to party	4.17	.61	Computer time (1/2 hr.)	2.83	.71
Buying new clothes \$50	4.07	.56	Playing board games (1 hr.)	2.84	.54
Going on a date	4.06	.87	Skiing (1 hr.)	2.86	.69
Going to movie	4.03	.92	Going on a picnic	2.87	.70
Meeting interesting people	3.93	.73	Photography	2.94	.52
Soda-pop (6-pack)	3.91	.85	Reading (1 hr.)	2.99	.67
Taking class trip	3.85	.91	Slushes (1 glass)	3.10	.73
Going to a concert	3.81	.91	Exercise (1 hr.)	3.14	1.08
Talking on the phone to a friend (1 hr.)	3.80	.82	Going camping	3.16	.90
Going to a dance	3.68	.76	Shopping/go to mall	3.18	.79
Getting ticket to sporting event	3.54	.79	Potato chips (1 bag)	3.19	.97
Going on a family vacation	3.47	.88	Playing basketball (1 hr.)	3.21	.89

*Note:* Participants were asked to rate their preference for each reward on 5-point Likert scale (1= *not likely*; 5= *very likely*)

Table C2

*Twenty most and least popular rewards: 2016 data*

<b>Most Popular</b>	<i>M</i>	<i>SD</i>	<b>Least Popular</b>	<i>M</i>	<i>SD</i>
Receiving diploma	4.73	.73	Skiing (1 hr.)	2.00	1.27
Listening to music (1 hr.)	4.58	.78	Riding motorcycle	2.40	1.47
Going to movie	4.58	.70	Missing class	2.72	1.33
Talking to friend (1 hr.)	4.53	.79	Writing letter to friend	2.73	1.34
Receiving \$5 cash	4.46	.84	Playing musical instrument	2.78	1.48
Pizza (1 Lg.)	4.44	.91	Baseball (1 hr.)	2.81	1.42
Going on family vacation	4.30	.93	Stickers, buttons, or posters	2.87	1.38
Buying new clothes (\$50)	4.26	1.09	Buying 1 record or tape	2.88	1.40
Going to amusement park	4.24	1.01	Photography	3.11	1.40
Watching T.V (1 hr.)	4.17	.94	Football (1 hr.)	3.14	1.50
Download music	4.16	1.07	Cooking	3.16	1.36
Vocal support/praise	4.13	1.06	Going camping	3.17	1.41
Extended curfew	4.09	1.20	Playing board games (1 hr.)	3.22	1.23
Doritos (1 bag)	4.08	1.06	Drawing /b painting (1 hr.)	3.23	1.42
Going to nice restaurant	4.04	1.00	Going on picnic	3.31	1.30
Sleeping 1 hr. past alarm	4.03	1.20	Basketball (1 hr.)	3.44	1.42
Potato chips (1 bag)	4.02	1.01	Going to school assembly	3.44	1.16
Nachos (1 order)	4.02	1.01	Going to dance	3.49	1.29
Computer time (1/2 hr.)	3.97	1.06	Getting \$5 school supplies	3.52	1.24
Exercise (1 hr.)	3.95	1.07	Swimming (1 hr.)	3.56	1.28

*Note:* Participants were asked to rate their preference for each reward on 5-point Likert scale (1=*not likely*; 5=*very likely*)

## Appendix D

Table D1

*Ten most and least popular rewards by academic grade: 1991 data*

<b>9 grade (n= 60)</b>					
<b>Most Popular</b>			<b>Least Popular</b>		
	<i>M</i>	<i>SD</i>		<i>M</i>	<i>SD</i>
Receiving \$5 cash	4.58	.68	Playing board games (1 hr.)	2.53	.83
Going to party	4.35	.87	School supplies (\$5)	2.55	.79
Pizza (1 Lg.)	4.34	.78	Photography	2.58	.91
Listening to music (1 hr.)	4.33	.90	Cooking	2.59	.66
Driving a car (1 evening)	4.32	.64	Stickers, buttons, or posters	2.73	.96
Going to a movie	4.31	.82	Visiting relatives	2.91	.93
Sleeping (1 hr. past alarm)	4.25	.71	Playing musical instrument (1 hr.)	2.92	.86
Watching TV (1 hr.)	4.15	.71	Exercise (1 hr.)	3.01	.82
Missing class	4.03	.92	Reading (1 hr.)	3.03	.69
Buying 1 record or tape	3.93	.78	Computer time (1/2 hr.)	3.08	.86
<b>10 grade (n= 62)</b>					
<b>Most Popular</b>			<b>Least Popular</b>		
	<i>M</i>	<i>SD</i>		<i>M</i>	<i>SD</i>
Receiving \$5 cash	4.62	.68	School supplies (\$5)	2.33	.76
Going on date	4.60	.94	Computer time (1/2 hr.)	2.36	.81
Listen to music (1 hr.)	4.56	.82	Playing a musical instrument (1 hr.)	2.41	.89
Talking to a friend (1 hr.)	4.55	.72	Playing board games (1 hr.)	2.47	.77
Going to a movie	4.53	.78	Reading (1 hr.)	2.53	.62
Pizza (1 Lg.)	4.50	.62	Playing baseball (1 hr.)	2.57	.91
Going to a party	4.43	.89	Drawing or painting (1 hr.)	2.68	.87
Shopping at mal	4.09	.93	Photography	2.75	.85
Soda pop (6-pack)	3.93	.78	Candy bars (2)	2.78	.99
Tanning	3.90	1.01	Playing video games (1/2 hr.)	2.81	.84
<b>11 grade (n= 75)</b>					
<b>Most Popular</b>			<b>Least Popular</b>		
	<i>M</i>	<i>SD</i>		<i>M</i>	<i>SD</i>
Receiving \$5 cash	4.36	.72	Swimming	2.39	.71
Extended curfew	4.21	1.02	Playing board games (1 hr.)	2.42	.69
Buying 1 record or tape	4.18	.80	Drawing or painting (1 hr.)	2.46	.74
Listening to music (1 hr.)	4.15	.86	Playing musical instrument (1 hr.)	2.53	.76
Sleep (1 hr. past alarm)	4.12	.92	Computer time (1/2 hr.)	2.61	.86
Going to party	4.10	1.05	Potato chips (1 bag)	2.68	.84
Going to a movie	4.06	1.01	School supplies (\$5)	2.70	.64
Soda pop (6-pack)	4.01	.90	Cooking	2.77	.72
Pizza (1 Lg.)	3.98	.71	Riding a motorcycle	2.82	1.06
Going on a date	3.95	.94	Playing video games (1/2 hr.)	2.90	.95
<b>12 grade (n= 21)</b>					
<b>Most Popular</b>			<b>Least Popular</b>		
	<i>M</i>	<i>SD</i>		<i>M</i>	<i>SD</i>
Receiving \$5 cash	4.35	.87	Reading (1 hr.)	2.46	.66
Extended curfew	4.31	.82	Riding motorcycle	2.51	.82
Pizza (1 Lg.)	4.28	.70	Missing class	2.57	.98
Sleep (1 hr. past alarm)	4.15	1.10	School supplies (\$5)	2.72	.62
Listen to music (1 hr.)	4.12	.95	Visiting relatives	2.74	1.08
Taking a family vacation	4.08	.91	Computer time (1/2 hr.)	2.83	.96
Getting good grades fx	4.01	1.02	Drawing or painting (1 hr.)	2.88	.78
Going to a concert	3.91	1.07	Playing board games	2.91	.85
Going out to eat at nice restaurant	3.87	.98	Going on picnic	3.06	.76
Going to a movie	3.83	1.02	Receiving stickers, buttons, or posters	3.12	.89



Table D2

Ten most and least popular rewards by academic grade: 2016 data

9 <sup>th</sup> grade (n= 75)					
Most Popular			Least Popular		
	<i>M</i>	<i>SD</i>		<i>M</i>	<i>SD</i>
Receiving diploma	4.72	.73	Skiing (1 hr.)	2.03	1.36
Listening to music (1 hr.)	4.69	.62	Riding motorcycle	2.35	1.48
Talking to friend (1 hr.)	4.53	.81	Writing letter to friend	2.77	1.35
Going to movie	4.49	.78	Missing class	2.83	1.37
Receive \$5 cash	4.48	.84	Buying 1 record or tape	2.85	1.45
Pizza (1 Lg.)	4.33	1.02	Playing musical instrument (1 hr.)	2.87	1.43
Buy new clothes (\$50)	4.25	1.09	Baseball (1 hr.)	2.93	1.51
Going on family vacation	4.21	1.06	Photography	2.95	1.42
Going on class trip	4.20	.93	Buttons, stickers, or posters	2.96	1.32
Doritos (1 bag)	4.19	1.15	Cooking	3.05	1.47
10 <sup>th</sup> grade (n= 78)					
Most Popular			Least Popular		
	<i>M</i>	<i>SD</i>		<i>M</i>	<i>SD</i>
Receiving a diploma	4.73	.82	Skiing (1 hr.)	1.85	1.22
Going to a movie	4.65	.70	Riding motorcycle	2.36	1.52
Receiving \$5 cash	4.58	.70	Missing class	2.56	1.37
Listening to music (1 hr.)	4.57	.85	Receiving buttons, stickers, or posters	2.60	1.42
Talking to friend (1 hr.)	4.57	.85	Writing letter to friends	2.70	1.41
Going on family vacation	4.46	.88	Playing musical instrument (1 hr.)	2.71	1.51
Pizza (1 Lg.)	4.44	.93	Baseball (1 hr.)	2.73	1.37
Going to amusement park	4.37	1.01	Buying 1 record or tape	2.94	1.38
Going on class trip	4.27	.94	Photography	2.99	1.32
Buying new clothes (\$50)	4.26	1.11	Football	3.12	1.45
11 <sup>th</sup> grade (n= 64)					
Most popular			Least Popular		
	<i>M</i>	<i>SD</i>		<i>M</i>	<i>SD</i>
Receiving a diploma	4.70	.75	Skiing (1 hr.)	2.06	1.17
Listening to music (1 hr.)	4.66	.72	Riding motorcycle	2.44	1.42
Going to movie	4.64	.60	Missing class	2.58	1.34
Talking to friends (1 hr.)	4.52	.89	Baseball (1 hr.)	2.63	1.32
Receive \$5 cash	4.49	.86	Writing letter to friend	2.63	1.27
Pizza (1 Lg.)	4.49	.88	Buying 1 record or tape	2.69	1.46
Buying new clothes (\$50)	4.35	1.02	Playing musical instrument (1 hr.)	2.70	1.49
Going to amusement park	4.23	.95	Receiving stickers, buttons, or posters	2.90	1.36
Doritos (1 bag)	4.22	.85	Football (1 hr.)	2.97	1.58
Potato chips (1 bag)	4.20	.78	Playing board games (1 hr.)	3.03	1.21
12 grade (n= 64)					
Most Popular			Least Popular		
	<i>M</i>	<i>SD</i>		<i>M</i>	<i>SD</i>
Receiving a diploma	4.78	.58	Skiing (1 hr.)	2.08	1.33
Talking to friend (1 hr.)	4.55	.64	Riding motorcycle	2.44	1.50
Going to movie	4.55	.69	Writing letters to friend	2.78	1.34
Pizza (1 Lg.)	4.53	.80	Playing musical instrument (1 hr.)	2.84	1.56
Listening to music (1 hr.)	4.38	.90	Missing class	2.89	1.22
Nachos (1 plate)	4.31	.75	Baseball (1 hr.)	2.97	1.49
Going on family vacation	4.31	.73	Drawing or painting (1 hr.)	3.02	1.46
Going on date with someone you like	4.31	1.02	Buying 1 record or tape	3.05	1.30
Getting extended curfew	4.30	.88	Buttons, stickers, or posters	3.05	1.42
Receive \$5 cash	4.25	.96	Cooking	3.08	1.41

## Appendix E

Table E1

2016 data: Top 20 most and least popular rewards with new rewards included

<b>Most popular</b>	<i>M</i>	<i>SD</i>
Receiving diploma	4.73	.73
Listening to music	4.58	.78
Going to movie	4.57	.72
Talk to friend (1 hr.)	4.52	.80
Receive \$5 cash	4.46	.84
Pizza (1 Lg.)	4.44	.92
Gift certificate to favorite store (\$5) <i>rp</i>	4.38	.97
Going on family vacation	4.28	.95
Browse internet (1 hr.) <i>rp</i>	4.28	.96
Buy new clothes (\$50)	4.24	1.11
Go to amusement park	4.23	1.02
Watch T.V. (1 hr.)	4.17	.95
Going on class trip	4.17	.96
Download music	4.14	1.03
Vocal support/praise	4.12	1.07
Extended curfew	4.08	1.21
Doritos (1 bag)	4.08	1.06
Going to nice restaurant	4.04	1.00
Sleeping 1 hr. past alarm	4.03	1.20
Facebook/Instagram (1 hr.) <i>rp</i>	4.02	1.20
<b>Least popular</b>		
Lacrosse (1 hr.) <i>tr</i>	1.95	1.27
Skiing (1 hr.)	2.00	1.26
Riding motorcycle	2.40	1.47
Missing class	2.71	1.33
Writing letters to friends	2.72	1.34
Energy drink (1 can) <i>tr</i>	2.73	1.54
Soccer <i>tr</i>	2.76	1.51
Play musical instrument	2.77	1.48
Baseball	2.82	1.42
Stickers, buttons, or posters	2.86	1.38
Buying 1 record or tape	2.87	1.40
Food truck visit <i>tr</i>	2.90	1.43
Bowling (1 hr.) <i>tr</i>	3.07	1.37
Photography	3.10	1.41
Football (1 hr.)	3.14	1.50
Cooking	3.14	1.37
Going camping	3.16	1.41
Playing board games (1 hr.)	3.21	1.23
Drawing or painting (1 hr.)	3.22	1.42
Going on picnic	3.29	1.31

Note: *tr* stands new items based on teacher recommendation; *rp* stands for rephrased SORT items based on

PEW research polls. standard deviation (*SD*); Mean(*M*)

## Appendix F

Table F1

*New SORT item Means within respective categories*

Categories	<i>M</i>	<i>SD</i>
<b>SPORTS</b>		
Exercise	3.95	1.07
Swimming	3.56	1.28
Basketball	3.44	1.42
Football	3.14	1.50
Bowling <i>tr</i>	3.08	1.37
Baseball	2.81	1.42
Soccer <i>tr</i>	2.76	1.51
Skiing	2.00	1.27
Lacrosse <i>tr</i>	1.95	1.27
<b>FOOD</b>		
Pizza (1 Lg)	4.44	.91
Doritos (1 bag)	4.08	1.06
Nachos (1 order)	4.02	1.00
Potato chips (1 bag)	4.01	1.09
Candy Bars (2)	3.93	1.09
Soda pop (6-pack)	3.85	1.32
Smoothie (any flavor) <i>tr</i>	3.83	1.18
Slushes (1 glass)	3.78	1.28
Food truck visit (1 item) <i>tr</i>	2.91	1.43
Energy drink (1 can) <i>tr</i>	2.73	1.54
<b>ENTERTAINMENT</b>		
Going to movie	4.57	.72
Browse internet (1 hr.) <i>rp</i>	4.28	.96
Watch TV (1 hr.)	4.17	.95
Download music	4.14	1.08
Facebook/Instagram (1hr.) <i>rp</i>	4.02	1.20
PlayStation / X-Box (1 hr.) <i>rp</i>	3.88	1.32
Going to concert	3.81	1.27
Tickets to sporting event	3.71	1.31
Going to dance	3.47	1.30
<b>OTHER</b>		
Receive \$5 cash	4.46	.84
\$5 Gift certificate to favorite store <i>tr</i>	4.38	.97
Buying new clothes \$50	4.24	1.11
Extended curfew	4.08	1.20
Sleeping 1 hr. past alarm	4.02	1.20

*Note:* *tr* stands new items based on teacher recommendation; *rp* stands for rephrased SORT items based on PEW research polls. standard deviation(*SD*); Mean(*M*). Participants were instructed to rate their preference on 5-point Likert scale ranging from 1 (*poorly*) to 5 (*very much*).

## Appendix G

Table G1

*Top 10 most popular rewards for males and female high school students in 2016*

Females	<i>M</i>	<i>SD</i>	Males	<i>M</i>	<i>SD</i>
Receiving diploma *	4.71	.82	Receiving diploma *	4.75	.63
Going to a movie *	4.64	.63	Listening to music (1 hr.) *	4.54	.74
Listening to music (1 hr.) *	4.63	.82	Going to a movie *	4.53	.75
Talking to friend (1 hr.) *	4.58	.83	Talking to friend (1 hr.) *	4.49	.76
Receiving \$5 cash *	4.53	.71	Pizza (1 Lg.) *	4.48	.92
Buying new clothes (\$50)	4.50	.93	Receiving \$5 cash *	4.39	.94
Pizza (1 Lg.) *	4.40	.91	Going on family vacation *	4.33	.90
Going on class trip	4.30	.85	Going to amusement park	4.23	1.04
Going on family vacation *	4.26	.96	Watching T.V. (1 hr.)	4.21	.92
Going to mall/shopping	4.25	1.06	Getting extended curfew	4.16	1.15

*Note:* Only the original 55 SORT items were used for reward comparisons across genders.

Items with an asterisk indicate that item was listed for both genders.

Table G2

*Top 10 least popular rewards for male and female high school students in 2016*

Female	<i>M</i>	<i>SD</i>	Male	<i>M</i>	<i>SD</i>
Skiing *	2.01	1.31	Skiing *	1.99	1.23
Riding motorcycle *	2.19	1.41	Writing letters to friends	2.47	1.35
Baseball (1 hr.)	2.40	1.38	Riding a motorcycle *	2.59	1.51
Football (1 hr.)	2.51	1.42	Receiving posters, stickers, or buttons	2.70	1.37
Missing class	2.58	1.32	Buying 1 record or tape	2.76	1.38
Playing musical instrument (1 hr.) *	2.78	1.44	Playing musical instrument (1 hr.) *	2.78	1.53
Basketball (1 hr.)	2.98	1.42	Missing class	2.84	1.33
Going camping	2.98	1.44	Photography	2.91	1.43
Buying 1 record or tape	3.01	1.42	Painting or drawing	2.93	1.45
Writing letter to friend	3.02	1.27	Cooking	2.99	1.43

*Note:* Only the original 55 SORT items were used for reward comparisons across genders.

Items with an asterisk indicate that item was listed for both genders.

Appendix H

Table H1

*Rotated principal components analysis component structure using varimax rotation*

SORT ITEMS	1	2	3	4	5	6	7	8
Photography	.68							
Playing musical instrument (1 hr.)	.67							
Going on picnic	.65							
Drawing or painting (1 hr.)	.62							
Writing letter to friend	.62							
Playing board games (1 hr.)	.61							
Going camping	.57							
Cooking	.56							
Receiving buttons, stickers, or posters	.56							
Reading books (1 hr.)	.56							
Buying 1 record or tape	.53							
Swimming (1 hr.)	.48						.43	
Riding motorcycle	.47							
Getting \$5 worth school supplies	.42							
Doritos (1 bag)		.75						
Candy bars (2)		.74						
Potato chips (1 bag)		.73						
Soda pop (6-pack)		.72						
Nachos (1 order)		.66						
Pizza (1 Lg.)		.62						
Slushes (1 glass)		.61						
Watching T.V. (1 hr.)		.45						
Browsing internet		.40						
Football (1 hr.)			.79					
Baseball (1 hr.)			.76					
Basketball (1 hr.)			.74					
Ticket to sporting event (1 hr.)			.62					
Playing X-box or PlayStation (1/2 hr.)			.48					
Exercise (1 hr.)			.46					.43
Skiing (1 hr.)			.42					
Going to mall/shopping				.68				
Talking on phone (1 hr.)				.58				
Going to party				.57				
Going to dance				.53				
Buying new clothes (\$50)				.51				
Meeting new people				.47				
Going on class trip				.42				
Vocal support/praise from teacher					.64			
Getting computer time (1/2 hr.)					.60			
Going to school assembly					.59			
Having input into school decisions					.40			
Getting \$5 worth school supplies					.52			

Getting extended curfew						.64		
Gong on date with someone you like						.57		
Driving/having nice car (for evening)						.57		
Sleeping past alarm (1 hr.)						.55		
Missing class						.47		
Listening to music (1 hr.)							.62	
Talking to friend (1 hr.)							.59	
Receiving diploma					.47		.58	
Going on family vacation								.67
Going to visit/revisit relatives								.49
Going to a movie								.46
Going to nice restaurant to eat								.46

*Note:* PCA was set to identify items-loadings  $\geq .40$ .

Items that did not load

- Receiving \$5 cash
- Going to amusement park
- Going to concert

## Appendix I

Table I1

*SORT item reconfiguration from PCA generated component structure.*

SORT Item	PCA generated component	New component
Swimming (1 hour)	1	Sports
Going camping	1	Leisure
Going on picnic	1	Leisure
Browsing the internet (1 hour)	2	Hobbies
PlayStation/X-Box (1/2 hour)	3	Hobbies
Missing class	6	School Activities
Receiving a diploma	7	School activities
Listening to music (1 hour)	7	Hobbies
Talking to friend (1 hour)	7	Social Activities
Going to a movie	8	Leisure
Going to nice restaurant	8	Leisure

*Note:* SORT items were removed from the PCA generated component and re-binned into a new component based on their corresponding themes and increased internal consistency of the new component.

Table I2

*Reliability and inter-item correlations for reconfigured SORT components*

Component	<i>N</i>	Cronbach's alpha	Inter-item correlation
1 (Hobbies)	14	.85	(.02-.57) ( <i>M</i> =.28)
2 (Food)	8	.85	(.22-.58) ( <i>M</i> =.41)
3 (Sports)	10	.82	(.09-.55) ( <i>M</i> =.32)
4 (Social Activities)	11	.85	(.12-.77) ( <i>M</i> =.33)
5 (School)	6	.73	(.24-.44) ( <i>M</i> =.35)
6 (Leisure)	10	.72	(-.07-.45) ( <i>M</i> =.22)

*Note:* *M* stands for mean inter-item correlation coefficient.

Table I3

*Component intercorrelation matrix using Pearson correlation coefficients*

	(1)Hobbies	(2)Food	(3)Sports	(4)Social Activities	(5)School	(6)Leisure
(1) Hobbies	1.0					
(2) Food	.36	1.0				
(3) Sports	.49	.26	1.0			
(4) Social Activities	.56	.43	.42	1.0		
(5)School	.55	.28	.36	.61	1.0	
(6) Leisure	.62	.41	.52	.70	.51	1.0



## Appendix J

Table J1

*Survey of Rewards for Teens- Revised*

Hobbies	Not likely	Fair	Moderate	Likely	Very Likely
Photography	1	2	3	4	5
Playing musical instrument (1 hr.)	1	2	3	4	5
Drawing or painting (1 hr.)	1	2	3	4	5
Writing letter to friend	1	2	3	4	5
Playing board games (1 hr.)	1	2	3	4	5
Cooking	1	2	3	4	5
Receiving buttons, stickers, or posters	1	2	3	4	5
Reading books	1	2	3	4	5
Buying 1 record or tape	1	2	3	4	5
Riding motorcycle	1	2	3	4	5
Browsing internet (1 hr.)	1	2	3	4	5
Downloading music	1	2	3	4	5
Listening to music (1 hr.)	1	2	3	4	5
PlayStation/X-box (1/2 hr.)	1	2	3	4	5

Food/Activity	Not likely	Fair	Moderate	Likely	Very Likely
Doritos (1 bag)	1	2	3	4	5
Candy bars (2)	1	2	3	4	5
Potato chips (1 bag)	1	2	3	4	5
Soda pop (6-pack)	1	2	3	4	5
Nachos (1 order or plate full)	1	2	3	4	5
Pizza (1 Lg.)	1	2	3	4	5
Slushes (1 glass)	1	2	3	4	5
Watching T.V. (1 hr.)	1	2	3	4	5

Sports	Not likely	Fair	Moderate	Likely	Very Likely
Football (1 hr.)	1	2	3	4	5
Baseball (1 hr.)	1	2	3	4	5
Basketball (1 hr.)	1	2	3	4	5

Ticket to sporting event	1	2	3	4	5
Exercise (1 hr.)	1	2	3	4	5
Skiing (1 hr.)	1	2	3	4	5
Swimming (1 hr.)	1	2	3	4	5
Lacrosse (1 hr.)	1	2	3	4	5
Soccer (1 hr.)	1	2	3	4	5
Bowling (1 hr.)	1	2	3	4	5

Social Activities	Not likely	Fair	Moderate	Likely	Very Likely
Going to mall/shopping	1	2	3	4	5
Talking on phone	1	2	3	4	5
Going to party	1	2	3	4	5
Going to dance	1	2	3	4	5
Buying new clothes	1	2	3	4	5
Meeting new people	1	2	3	4	5
Receiving \$5 cash	1	2	3	4	5
Receiving \$5 gift certificate to favorite store	1	2	3	4	5
Talking to friend (1 hr.)	1	2	3	4	5
Going on family vacation	1	2	3	4	5
Going to visit/revisit relatives	1	2	3	4	5

School	Not likely	Fair	Moderate	Likely	Very Likely
Vocal support/praise from teacher	1	2	3	4	5
Getting ½ hr. computer time	1	2	3	4	5
Going to school assembly	1	2	3	4	5
Having input into school decisions	1	2	3	4	5
Going on class trip	1	2	3	4	5
Receiving diploma	1	2	3	4	5

Leisure	Not likely	Fair	Moderate	Likely	Very Likely
Getting extended curfew	1	2	3	4	5

Going on date with someone you like	1	2	3	4	5
Driving/having nice car for evening	1	2	3	4	5
Sleeping past alarm (1 hr.)	1	2	3	4	5
Missing class	1	2	3	4	5
Going to amusement park	1	2	3	4	5
Going to movie	1	2	3	4	5
Going to nice restaurant	1	2	3	4	5
Going on picnic	1	2	3	4	5
Going camping	1	2	3	4	5

## Appendix J

Geographic Location of Sample Within the United States ( $N=283$ )

*Figure 1.* Geographic location of participants using longitude and latitude using reverse geocoding. The sample is considered nationally representative of high school adolescents.